

FINAL REPORT

SUMMER GRADUATE RESEARCH PROGRAM

FOR

INTERNS IN SCIENCE AND ENGINEERING

Grant No. NAG-1-956

GODDARD SPACE FLIGHT CENTER

AND

NASA-SPACE TECHNOLOGY DEVELOPMENT

AND

UTILIZATION PROGRAM

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NASA-STD P

March 24, 1992

GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

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INTRODUCTION

TITLE OF PROGRAM

The 1991 Goddard Summer Graduate Intern Program in Science and Engineering was administered through the North Carolina A&T State University NASA Space Technology Development and Utilization Program. STDP assisted in the recruitment and placement of students into work assignments at Goddard Space Flight Center and Marshall Space Flight Center. A full-time coordinator, Dr. Clinton Lee, was placed on-site for the duration of the summer in order to oversee intern activities and assist in making their transition as smooth as possible.

OVERALL PROGRAM OBJECTIVES

The goal of the 10 week Graduate Intern Program was to increase the source of candidates for positions in science and engineering at the Goddard Space Flight Center. Following, are overall program objectives:

1. To provide students entering, or in graduate programs in science, computer science, and engineering an opportunity to gain experience on problems compatible with the research interest of Goddard Space Flight Center;
2. To contribute to the research effort of Goddard Space Flight Center;
3. To increase the professional knowledge of the participants in the fields of science and engineering;
4. To increase the source of candidates for positions in science and engineering at the Goddard Space Flight Center.

SELECTION OF PARTICIPANTS

The students were selected by the GSFC/EEO office from those screened by the STDP office. They were all assigned mentors prior to the first day of the program, June 3, 1991. One of the interns turned down his appointment June 25, 1991, leaving an opening that was filled by Jesse Johnson. Mr. Johnson had participated previously in the Faculty Fellowship Program at NASA Goddard. He did not go through the standard selection procedure, but his situation at that point in time made him an ideal choice to fill the opening quickly. No students asked to be reassigned. Although Aquair Walton was not given a project right away, he was given a task at which he came into contact with many potential project supervisors and after less than three weeks found a match for his interest.

<u>NAME</u>	<u>SCHOOL</u>	<u>CODE</u>	<u>MENTOR</u>
ANTOINE, Lisa	NCA&TSU	513	Wayne Gustaffson
BOOKER, Mattie	Jackson State	554.2	Evette Brown-Conwell
BROWN, Beth	Howard Univ.	684.9	Carol Crannell
BROWN, Lamarr	Howard Univ.	917	Geary Schwemmer
DEJESUS, Carlos	Univ.P.R.	515	John Welch
FOSTER, Lisa	Temple	5323	Eric Richmond
JOHNSON, Jesse	John Hopkins	152	Bernard Dixon
TURNER, Curtis	Temple	936	Nino Bonavito
WALTON, Aquair	Fisk	660	Johnathan Ormes
YARBROUGH, Walthea	NCA&TSU	313	Charles Powers

Five of the students were housed at Seven Springs Village Apartments through arrangements made by NASA. These arrangements

were also utilized by other Goddard summer programs to house students and were fairly adequate to the task. At \$340/month, the rent was reasonable considering the \$425 weekly stipend given the interns.

SEMINAR TOPICS

A number of seminars were scheduled during the course of the summer to familiarize the interns, as well as other summer student employees, with Goddard Space Flight Center. The topics included the Hubble Space Telescope, Job Opportunities at the Center, Earth Observations Systems (EOS), a Space Science Seminar and were finalized with a roundtable discussion with the Director of the Center. These seminars were well attended and allowed the interns to ask viable questions in contemporary technical areas relevant to NASA as well as become informed of employment opportunities and procedures at Goddard Space Flight Center.

INTERN PLACEMENT

The Program Coordinator paid site visits to each of the interns at Goddard during the first two weeks of the program in order to evaluate the congruity of interests between them and their mentors. After the aforementioned adjustments, the mentor-intern relationships in all cases proved to be mutually beneficial. Inclusive of this report are copies of evaluation forms completed by the interns and their mentors. The comments contained, further emphasized what was evident in conversation with persons involved with the program. This program was a positive experience for intern and mentor alike.

ORAL PRESENTATIONS

Each intern was required to prepare a verbal presentation on assigned work activities. These talks were scheduled to be fifteen to twenty minutes in length and were delivered to audiences consisting of personnel ranging from mentors to division directorate level managers. A written summary of this talk was also required and is included in this report. These presentations provided an opportunity for top-level management to become aware of the pool of talent made available by the internship program. There was also a chance for attendees to suggest ways to improve the program.

COORDINATOR/MENTORS' COMMENTS

These talks illustrated that the interns had taken on challenging, relevant projects and performed competently in completing the tasks set before them. Through the coordinator's observations and mentors' comments, the following list of suggestions was compiled:

1. The center as a whole needs more information as to the purpose and procedures of this summer program. Their greater awareness could only enhance its effectiveness.
2. A short course on giving presentations would have benefitted the interns in preparing their talks during the program and thereafter. It would also alleviate some of the burden on the mentors in assisting the interns in their preparation. Perhaps next summer, the roadblocks to giving such a course could be given an assist towards alleviation by Goddard personnel.

SUMMARY

The ultimate measure of the success or failure of the 1991 Graduate Summer Intern Program will not be possible until these interns complete their degree(s) and decide upon permanent employment. A longitudinal study of the program's effectiveness is being implemented to track the activities of the participants. Mrs. Marie Alcorn of Howard University is being contracted to perform the study.

- One student has been offered an opportunity to continue at Goddard in another program, which is designed to allow him and his dissertation advisor to work on their research at Goddard.
- At least two of the interns either have submitted for publication or are in the process of submitting papers co-authored with their mentors to major journals. These papers stem from work done in conjunction with the completion of their projects.
- Many of the interns, mentors and managers from as high as the directorate level, have expressed personal interests in some particular intern returning to GSFC in some capacity in the near future. From the desire to return to the program, to an interest in hiring a particular intern as a permanent employee, the participants' performance aroused the attention of all involved.

APPENDIX A

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120 AS SOON AS POSSIBLE

Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center

NAME: 1 Lisa Antoine DATE: 8/7/91 MAJOR: Elec. Engineering
POSITION TITLE: Grad Intern SEMESTER: Summer YEAR: 1991
CODE/BRANCH: 513/Project Operations DIVISION: 510/Mission Operations
RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

Developed the Tractor and Baggage Machine using
Microsoft Excel for the K115T

BEGINNING OF WORK EXPERIENCE

Rating
(1-5)

Comments

1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..

3

2. ORIENTATIONS: at work, I received a complete orientation.

3

3. JOB DUTIES: were clearly defined.

2

4. MY MENTOR: was available to discuss questions or problems

3

5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.

3

INTERPERSONAL SKILLS

(1-5)

Comments

6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.

4

7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.

4

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.	4	

COMMUNICATION SKILLS AND WRITING

9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood; b) I expressed my communication needs appropriately.	a) 3 b) 4	
---	--------------	--

10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.	4	
---	---	--

11. WRITING SKILLS: My writing skills were adequate to do the job well.	4	
---	---	--

12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.	4	
--	---	--

MY WORK PERFORMANCE

13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.	4	
---	---	--

14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.	4	
---	---	--

15. COOPERATIVENESS: I was respectful of others, worked well in a team.	4	
---	---	--

16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.	4	
--	---	--

17. JOB ATTITUDE: I was hard-working and enthusiastic.	4	
--	---	--

18. INITIATIVE: I worked well on my own; I was a self-starter.	4	
--	---	--

19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.	3	
--	---	--

20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.	3	
--	---	--

21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.	4	
---	---	--

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	4	
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	4	
24. APPEARANCE: I dressed appropriately.	4	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	4	
26. NEW KNOWLEDGE: I learned new skills and information.	4	

<u>HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS</u>	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	4	
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	4	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	4	

- a) This work experience made my courses at _____ University more meaningful. PLEASE RATE: (YES) 4 3 (2) 1 (NO)
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) 4 (3) 2 1 (NO)
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 (1) (NO)
- d) I worked harder and learned more because I received credit (If applicable). PLEASE RATE: (YES) (4) 3 2 1 (NO)

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?

I would develop a plan or strategy to locate several projects to work on. I would have spent more time in the library where I get more work done with fewer distractions. I would have worked out (exercise) more.

2) What did you do in this work experience?

I developed an Xtractor and Bangray Macro for the KUST database by using Microsoft Excel.

3) What suggestions do you have for improving the Graduate Intern program?

A) Schedule Intern get-togethers once every week at least during 10-wk program.

B) Set pay dates so that wages may be received in a timely manner.

C) Urge Mentors to have defined projects for interns ^{before} arrival.

4) What would you say to other students about your Graduate Intern experience?

(We may use this for advertising)

There are many new areas at NASA for intellectual and personal development. It can be an exciting and challenging experience.

5) May we use other quotes from this report for advertising purposes?

YES ☒ NO ☐

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS POSSIBLE.

THANK YOU!!!!

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120 AS SOON AS POSSIBLE

**Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center**

NAME: Mathie Parker DATE: August 8, 1991 MAJOR: Mathematics

POSITION TITLE: Graduate Assistant SEMESTER: _____ YEAR: Graduate

CODE/BRANCH: 554.2 / 554 Flight Dynamics Analysis DIVISION: 550 Flight Dynamics Division

RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

The major duty that I had to perform while working
at GSFC was to determine a method to use of setting
the spacecraft entry and exit times of the mission zone.

BEGINNING OF WORK EXPERIENCE

Rating
(1-5)

Comments

1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..

3

2. ORIENTATIONS: at work, I received a complete orientation.

4

I was introduced properly

to the important people in my code.

3. JOB DUTIES: were clearly defined.

4

my job duty was explained

thoroughly from my mentor.

4. MY MENTOR: was available to discuss questions or problems

4

my mentor was available all the time

5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.

4

highly recommended my ideas.

INTERPERSONAL SKILLS

(1-5)

Comments

6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.

4

7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.

4

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.	4	

COMMUNICATION SKILLS AND WRITING

9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood; b) I expressed my communication needs appropriately.

a) 4
b) 4

10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.

4

11. WRITING SKILLS: My writing skills were adequate to do the job well.

3

12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.

4

MY WORK PERFORMANCE

13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.

4

14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.

4

15. COOPERATIVENESS: I was respectful of others, worked well in a team.

4

16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.

4

17. JOB ATTITUDE: I was hard-working and enthusiastic.

4

18. INITIATIVE: I worked well on my own; I was a self-starter.

4

19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.

4

20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.

4

21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.

4

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	4	
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	4	
24. APPEARANCE: I dressed appropriately.	4	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	4	
26. NEW KNOWLEDGE: I learned new skills and information.	4	

<u>HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS</u>	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	4	
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	2	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	4	

- a) This work experience made my courses at Jackson State University more meaningful. PLEASE RATE: (YES) (4) 3 2 1 (NO)
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) (4) 3 2 1 (NO)
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 1 (NO)
- d) I worked harder and learned more because I received credit (If applicable). N/A PLEASE RATE: (YES) 4 3 2 1 (NO)

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?
I wouldn't do this experience differently because I truly enjoyed my co-workers, and my work experience.

2) What did you do in this work experience?

My work experience was to determine the FAST spacecraft entry and exit times of the aurora zone.

3) What suggestions do you have for improving the Graduate Intern program?

The suggestions that I have for improving the Graduate Intern program are: to have a course designed for public speaking, to inform students ahead of time about the type of work involved, and to have a schedule for monetary funds issued.

4) What would you say to other students about your Graduate Intern experience?

(We may use this for advertising)

I would inform other students that working at GSFC is a good & challenging work experience. It gives one the opportunity to work around professional, & scientific persons. Furthermore, it lets the student know if he/she wants to work in the science related or research world.

5) May we use other quotes from this report for advertising purposes?

YES ☒ NO ☐

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THANK YOU!!!!!!

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Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center

NAME: Edith Krieger DATE: 7/18/91 MAJOR: astrophysics

POSITION TITLE: _____ SEMESTER: Summer YEAR: 1991

CODE/BRANCH: 6849 DIVISION: _____

RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

research (literary)
teaching assistant (correspond to weight)
researcher

<u>BEGINNING OF WORK EXPERIENCE</u>	Rating (1-5)	Comments
1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..	1	received some information late, second-hand, or not at all.
2. ORIENTATIONS: at work, I received a complete orientation.	2	Also, certain situations arose in which I felt considered.
3. JOB DUTIES: were clearly defined.	3	
4. MY MENTOR: was available to discuss questions or problems	4	
5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.	4	

<u>INTERPERSONAL SKILLS</u>	(1-5)	Comments
6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.	2	There was not the much opportunity to interact as I was.
7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.	4	

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.	4	
<u>COMMUNICATION SKILLS AND WRITING</u>	(1-5)	Comments
9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood; b) I expressed my communication needs appropriately.	a) 4 b) 4	
10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.	4	
11. WRITING SKILLS: My writing skills were adequate to do the job well.	4	Only writing that occurred was in Singapore
12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.	3	
<u>MY WORK PERFORMANCE</u>	(1-5)	Comments
13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.	4	
14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.	4	
15. COOPERATIVENESS: I was respectful of others, worked well in a team.	N/A	
16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.	4	
17. JOB ATTITUDE: I was hard-working and enthusiastic.	3	
18. INITIATIVE: I worked well on my own; I was a self-starter.	4	
19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.	4	
20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.	4	
21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.	3	

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	3	
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	4	
24. APPEARANCE: I dressed appropriately.	3	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	N/A	
26. NEW KNOWLEDGE: I learned new skills and information.	3	

<u>HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS</u>	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	N/A	
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	1	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	2	

- a) This work experience made my courses at Howard University more meaningful. PLEASE RATE: (YES) 4 (3) 2 1 (NO)
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) 4 (3) 2 1 (NO)
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 1 ((NO))
- d) I worked harder and learned more because I received credit (If applicable). PLEASE RATE: (YES) 4 3 2 1 (NO)

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?

- a) I would look more into how different branches of physics related to the work I was doing.
- b) Do something relating more to my specific major (my major was astrophysics - I was working a lot w/ supernova detectors).
- c) interact more w/ NASA personnel

- 2) What did you do in this work experience? I did research on materials in the construction of a laser telescope mirror model. I worked w/ superconductors to studying levitation and how much weight could be levitated by available materials.
- 3) What suggestions do you have for improving the Graduate Intern program?

I would have the participants get together to meet each other at the beginning of the program instead of the end. Also I would encourage them to meet at least once a week to see what each other was doing.

- 4) What would you say to other students about your Graduate Intern experience?

(We may use this for advertising)

It was a great experience for learning more about what you can do with your major.

- 5) May we use other quotes from this report for advertising purposes?
YES ~~YES~~ NO ☒

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THANK YOU!!!!!!

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Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center

NAME: LAMARR A. BROWN DATE: 8/8/91 MAJOR: PHYSICS

POSITION TITLE: GRAD. INTERN SEMESTER: _____ YEAR: _____

CODE/BRANCH: 917/LABORATORY DIVISION: FOR ATMOSPHERES

RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

INJECTION SEEDING OF Q-SWITCHED ALEXANDRITE LASER AND THEN STUDIED THE FREQUENCY STABILIZATION OF THE Q-SWITCH ALEXANDRITE LASER BY USING A LASER DIODE.

<u>BEGINNING OF WORK EXPERIENCE</u>	Rating (1-5)	Comments
1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..	4	
2. ORIENTATIONS: at work, I received a complete orientation.	3	
3. JOB DUTIES: were clearly defined.	4	
4. MY MENTOR: was available to discuss questions or problems	4	
5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.	4	

<u>INTERPERSONAL SKILLS</u>	(1-5)	Comments
6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.	4	
7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.	4	

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.	4	

<u>COMMUNICATION SKILLS AND WRITING</u>	(1-5)	Comments
9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood; b) I expressed my communication needs appropriately.	a) 4 b) 4	
10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.	4	
11. WRITING SKILLS: My writing skills were adequate to do the job well.	3	
12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.	3	

<u>MY WORK PERFORMANCE</u>	(1-5)	Comments
13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.	4	
14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.	4	
15. COOPERATIVENESS: I was respectful of others, worked well in a team.	4	
16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.	4	
17. JOB ATTITUDE: I was hard-working and enthusiastic.	4	
18. INITIATIVE: I worked well on my own; I was a self-starter.	4	
19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.	4	
20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.	4	
21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.	3	

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	4	
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	4	I was not absences
24. APPEARANCE: I dressed appropriately.	4	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	4	
26. NEW KNOWLEDGE: I learned new skills and information.	4	

<u>HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS</u>	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	4	
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	4	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	4	

- a) This work experience made my courses at HAMPTON University more meaningful. PLEASE RATE: (YES) (4) 3 2 1 (NO)
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) (4) 3 2 1 (NO)
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 (1) (NO)
- d) I worked harder and learned more because I received credit (If applicable). PLEASE RATE: (YES) (4) 3 2 1 (NO)

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?
would not change a thing,

2) What did you do in this work experience?

injection seeding of a Q-switched alexandrite laser and then studied the frequency stabilization of the Q-switched alexandrite laser by using a laser diode.

3) What suggestions do you have for improving the Graduate Intern program?

would not change a thing.

4) What would you say to other students about your Graduate Intern experience?

(We may use this for advertising)

try it, you'll like it.

5) May we use other quotes from this report for advertising purposes?

YES ☒

NO ☐

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS POSSIBLE.

THANK YOU!!!!!!

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120 AS SOON AS POSSIBLE

Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center

NAME: Carlos E. De Jesus DATE: August 9, 1991 MAJOR: Electrical Engineering

POSITION TITLE: _____ SEMESTER: _____ YEAR: _____

CODE/BRANCH: 515 / Simulation & Compatibility Test DIVISION: _____

RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

Modifications for A Communication Interface Board

<u>BEGINNING OF WORK EXPERIENCE</u>	Rating (1-5)	Comments
--	-----------------	----------

1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..		4
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2. ORIENTATIONS: at work, I received a complete orientation.	4	
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3. JOB DUTIES: were clearly defined.	4	
--------------------------------------	---	--

4. MY MENTOR: was available to discuss questions or problems	4	
--	---	--

5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.	4	
--	---	--

INTERPERSONAL SKILLS

	(1-5)	Comments
--	-------	----------

6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.	4	
--	---	--

7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.	4	
---	---	--

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.	4	

<u>COMMUNICATION SKILLS AND WRITING</u>	(1-5)	Comments
9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood; b) I expressed my communication needs appropriately.	a) 3 b) 3	
10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.	3	
11. WRITING SKILLS: My writing skills were adequate to do the job well.	3	
12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.	4	

<u>MY WORK PERFORMANCE</u>	(1-5)	Comments
13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.	4	
14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.	4	
15. COOPERATIVENESS: I was respectful of others, worked well in a team.	4	
16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.	4	
17. JOB ATTITUDE: I was hard-working and enthusiastic.	4	
18. INITIATIVE: I worked well on my own; I was a self-starter.	4	
19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.	4	
20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.	4	
21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.	4	

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	3	worked a delay with our schedule due to problems with the equipment.
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	4	
24. APPEARANCE: I dressed appropriately.	4	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	4	
26. NEW KNOWLEDGE: I learned new skills and information.	3	

<u>HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS</u>	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	4	
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	4	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	4	

- a) This work experience made my courses at _____ University more meaningful. PLEASE RATE: (YES) 4 3 2 1 (NO) ☒ 4
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) 4 3 2 1 (NO) ☒ 4
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 1 (NO) ☒ 4
- d) I worked harder and learned more because I received credit (If applicable). PLEASE RATE: (YES) 4 3 2 1 (NO) ☒ 4

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?

In addition to work in electronics & communication I would like to work with control systems.

2) What did you do in this work experience?

- Modification for a Communication Interface Board by using EPLDs.
- Simulate selected portion of the schematics by using Altera 1990 & Altera 1991
- Substitute old Fifos with New FIFOs that include Serial-Parallel Conversion

3) What suggestions do you have for improving the Graduate Intern program?

4) What would you say to other students about your Graduate Intern experience?

(We may use this for advertising)

I had the opportunity to learn a lot... and I learned a Lot.

I would like to be back... as a permanent employee.

5) May we use other quotes from this report for advertising purposes?

YES ☒ NO ☐

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS POSSIBLE.

THANK YOU!!!!

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120 AS SOON AS POSSIBLE

Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center

NAME: Lisa D. Foster DATE: Aug 7, 1991 MAJOR: Mathematics

POSITION TITLE: Grad Student SEMESTER: _____ YEAR: 2nd

CODE/BRANCH: Code 530 DIVISION: _____

RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

Responsible for modeling activities within code 530
More specifically, the space network system

<u>BEGINNING OF WORK EXPERIENCE</u>	Rating (1-5)	Comments
1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..	3	
2. ORIENTATIONS: at work, I received a complete orientation.	4	
3. JOB DUTIES: were clearly defined.	3	
4. MY MENTOR: was available to discuss questions or problems	4	
<u>My mentor taught me a lot more than what my project entailed.</u>		
5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.	4	

<u>INTERPERSONAL SKILLS</u>	(1-5)	Comments
6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.	3	
7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.	3	

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.	2	
<u>COMMUNICATION SKILLS AND WRITING</u>	(1-5)	Comments
9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood; b) I expressed my communication needs appropriately.	a) 3 b) 3	
10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.	4	
11. WRITING SKILLS: My writing skills were adequate to do the job well.	3	
12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.	3	
<u>MY WORK PERFORMANCE</u>	(1-5)	Comments
13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.	2	
14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.	3	
15. COOPERATIVENESS: I was respectful of others, worked well in a team.	3	
16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.	4	
17. JOB ATTITUDE: I was hard-working and enthusiastic.	3	
18. INITIATIVE: I worked well on my own; I was a self-starter.	2	
19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.	3	
20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.	4	
21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.	3	

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	3	
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	3	
24. APPEARANCE: I dressed appropriately.	2	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	3	
26. NEW KNOWLEDGE: I learned new skills and information.	4	

<u>HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS</u>	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	4	
<i>We were in constant contact through the electronic mail</i>		
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	2	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	3	

- a) This work experience made my courses at Temple University more meaningful. PLEASE RATE: (YES) 4 (3) 2 1 (NO)
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) 4 (3) 2 1 (NO)
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 (1) (NO)
- d) I worked harder and learned more because I received credit (If applicable). PLEASE RATE: (YES) 4 3 2 (1) (NO)

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?
I would request a schedule of events, i.e. meetings, abstracts etc. (not talks), prior to my arrival at NASA.

2) What did you do in this work experience?

Mathematical analysis, researched the space network system.

3) What suggestions do you have for improving the Graduate Intern program?

Have a gathering of the students during their first week at Goddard in order for the students to come together as a support unit.

4) What would you say to other students about your Graduate Intern experience?

(We may use this for advertising)

My experience here was very rewarding. I learned more than just academics.

5) May we use other quotes from this report for advertising purposes?

YES ☒

NO ☐

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS POSSIBLE.

THANK YOU!!!!!!

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120 AS SOON AS POSSIBLE

Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center

NAME: J P Johnson DATE: 8/3/91 MAJOR: Engineering

POSITION TITLE: _____ SEMESTER: _____ YEAR: _____

CODE/BRANCH: 152 / Research Analyst DIVISION: GSFC

RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

BEGINNING OF WORK EXPERIENCE

Rating
(1-5)

Comments

1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..

3

2. ORIENTATIONS: at work, I received a complete orientation.

3

3. JOB DUTIES: were clearly defined.

2

4. MY MENTOR: was available to discuss questions or problems

3

5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.

2

INTERPERSONAL SKILLS

(1-5)

Comments

6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.

3

7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.

3

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.		3

<u>COMMUNICATION SKILLS AND WRITING</u>	(1-5)	Comments
9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood;	a)	2
b) I expressed my communication needs appropriately.	b)	2
10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.		2
11. WRITING SKILLS: My writing skills were adequate to do the job well.		2
12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.		3

<u>MY WORK PERFORMANCE</u>	(1-5)	Comments
13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.		2
14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.		2
15. COOPERATIVENESS: I was respectful of others, worked well in a team.		2
16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.		2
17. JOB ATTITUDE: I was hard-working and enthusiastic.		2
18. INITIATIVE: I worked well on my own; I was a self-starter.		2
19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.		2
20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.		2
21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.		2

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	3	
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	3	
24. APPEARANCE: I dressed appropriately.	3	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	3	
26. NEW KNOWLEDGE: I learned new skills and information.	3	

<u>HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS</u>	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	3	
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	3	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	3	

- a) This work experience made my courses at _____ University more meaningful. PLEASE RATE: (YES) 4 3 2 1 (NO)
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) 4 3 2 1 (NO)
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 1 (NO)
- d) I worked harder and learned more because I received credit (If applicable). PLEASE RATE: (YES) 4 3 2 1 (NO)

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?

Nothing

2) What did you do in this work experience?

- This was my 3rd summer here, I participated in a course based on my work from the fall. I was very involved and did some analysis of a program and a marketing course.

3) What suggestions do you have for improving the Graduate Intern program?

4) What would you say to other students about your Graduate Intern experience?

(We may use this for advertising)

- 5) May we use other quotes from this report for advertising purposes?

YES A NO

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS POSSIBLE.

THANK YOU!!!!!!

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120 AS SOON AS POSSIBLE

Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center

NAME: A.L. WALTON DATE: 8/6/91 MAJOR: PHYSICS
POSITION TITLE: STUDENT SEMESTER: 3rd YEAR: 1992
CODE/BRANCH: 660 DIVISION: X-RAY

RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

① OVERVIEW VIEW GRAPH SET
② ANALYZE BBXRT DATA

<u>BEGINNING OF WORK EXPERIENCE</u>	Rating (1-5)	Comments
1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..	④	
2. ORIENTATIONS: at work, I received a complete orientation.	④	
3. JOB DUTIES: were clearly defined.	④	
4. MY MENTOR: was available to discuss questions or problems	③	
5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.	④	

<u>INTERPERSONAL SKILLS</u>	(1-5)	Comments
6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.	④	
7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.	③	

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.	4	

<u>COMMUNICATION SKILLS AND WRITING</u>	(1-5)	Comments
9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood; b) I expressed my communication needs appropriately.	a) 3 b) 3	
10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.	4	
11. WRITING SKILLS: My writing skills were adequate to do the job well.	4	
12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.	4	

<u>MY WORK PERFORMANCE</u>	(1-5)	Comments
13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.	4	
14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.	4	
15. COOPERATIVENESS: I was respectful of others, worked well in a team.	4	
16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.	4	
17. JOB ATTITUDE: I was hard-working and enthusiastic.	4	
18. INITIATIVE: I worked well on my own; I was a self-starter.	4	
19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.	3	
20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.	3	
21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.	3	

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	3	
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	4	
24. APPEARANCE: I dressed appropriately.	4	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	4	
26. NEW KNOWLEDGE: I learned new skills and information.	4	

HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS

	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	4	
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	4	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	4	

- a) This work experience made my courses at _____ University more meaningful. PLEASE RATE: (YES) 4 3 2 1 (NO) 4
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) 4 3 2 1 (NO) 4
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 1 (NO) 1
- d) I worked harder and learned more because I received credit (If applicable). PLEASE RATE: (YES) 4 3 2 1 (NO) 1

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?

- TALK W/OTHERS MORE

2) What did you do in this work experience?

- ① TALKED TO EMPLOYEES
- ② ANALYZE DATA;

3) What suggestions do you have for improving the Graduate Intern program?

- MORE INTERACTION W/STUDENTS
- AN ORIENTATION TO GODDARD, WOULD BE NICE (WALKING TOUR)

4) What would you say to other students about your Graduate Intern experience?

(We may use this for advertising)

IT WAS A LOT OF
HARD THINKING - WORK!

5) May we use other quotes from this report for advertising purposes?

YES _____

NO ~~_____~~

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS POSSIBLE.

THANK YOU!!!!!!

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120 AS SOON AS POSSIBLE

Graduate Intern Program
Student Self Evaluation
North Carolina A&T State University
NASA/Goddard Space Flight Center

NAME: Wallhea V. Yarbrough DATE: August 8, 1991 MAJOR: Industrial Engineering

POSITION TITLE: Graduate Intern SEMESTER: _____ YEAR: _____

CODE/BRANCH: 313/Materials Branch-Ceramics Section DIVISION: Office of Night Assurance (310)

RATING SCALE: 1-needs improvement; 2-average; 3-good; 4-excellent; 5-N/A

Comments are very helpful to us. Please try to give some specific remarks that will support your rating.

YOUR GRADUATE INTERN WORK EXPERIENCE

Briefly list the major duties you performed during your work experience:

Programming a controller to create a life long bearing test, and writing a DBASE
program to allow easier access for a memorandum file in the branch.

<u>BEGINNING OF WORK EXPERIENCE</u>	Rating (1-5)	Comments
1. PROGRAM COORDINATOR: answered my questions, informed me well, helped me to deal with my concerns..	3	Dr. Lee answered all of my questions to the best of his ability. I think however, that he was sometimes misinformed, and thereby relayed incorrect information.
2. ORIENTATIONS: at work, I received a complete orientation.	3	The branch gave me an initial orientation, covering everything of use. It would have been more beneficial for me if I had been given as much information as I went along and as it pertained to my projects.
3. JOB DUTIES: were clearly defined.	4	
4. MY MENTOR: was available to discuss questions or problems	4	My mentor was a great mentor. He not only was available to help me, but he helped other students as well as other Goddard employees. He seems to be a jack of all trades.
5. MY MENTOR: welcomed my ideas and comments, gave feedback and information.	4	

<u>INTERPERSONAL SKILLS</u>	(1-5)	Comments
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6. WITH OTHER EMPLOYEES: I interacted assertively, adapted myself to the personalities of others, and started conversations.	1	I did not feel welcomed in the Branch, therefore I did nothing to make myself more friendly. Other than my mentor, no one else seemed to really be friendly to me.
7. WITH MY MENTOR: I initiated questions and ideas, demonstrated responsible, assertive behavior.	2	I did demonstrate responsible behavior, however it was my first time until the end of the program. I was to mechanically complete a task that had been defined prior to my arrival. Therefore, the only questions that I needed to ask were those that clarified my tasks.

	Rating (1-5)	Comments
8. ACCEPTING FEEDBACK: I considered guidance and feedback with a positive attitude.	3	

<u>COMMUNICATION SKILLS AND WRITING</u>	(1-5)	Comments
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9. COMMUNICATION SKILLS: a) I was able to understand others and make myself understood; b) I expressed my communication needs appropriately.	a) 4 b) 3	
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10. SENSE OF HUMOR: I showed patience, humor, and a good attitude in communication.	2	
---	---	--

11. WRITING SKILLS: My writing skills were adequate to do the job well.	4	
---	---	--

12. COMMUNICATION ATTITUDE: I demonstrated self-confidence, sensitivity; helped others feel comfortable.	4	
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<u>MY WORK PERFORMANCE</u>	(1-5)	Comments
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13. DEPENDABILITY: I was prompt, trustworthy, followed directions well.	4	
---	---	--

14. ADAPTABILITY: I was flexible, switched to new jobs easily, adjusted well to change.	3	
---	---	--

15. COOPERATIVENESS: I was respectful of others, worked well in a team.	5	
---	---	--

16. DESIRE TO LEARN: I asked questions, challenged myself, asked for feedback.	2	
--	---	--

17. JOB ATTITUDE: I was hard-working and enthusiastic.	3	
--	---	--

18. INITIATIVE: I worked well on my own; I was a self-starter.	4	
--	---	--

19. JOB KNOWLEDGE: I had job skills needed for the job or I learned them on the job.	4	
--	---	--

20. APTITUDE: I understood instructions quickly and solved new problems easily and creatively.	3	
--	---	--

21. QUALITY OF WORK: I did work carefully, thoroughly, correctly.	4	
---	---	--

	Rating (1-5)	Comments
22. QUANTITY OF WORK: I did all that was expected of me and sometimes more.	4	
23. ATTENDANCE: I was on time, or contacted my supervisor in advance about absences.	4	
24. APPEARANCE: I dressed appropriately.	4	
25. STABILITY: I handled pressure well and remained calm in crisis situations.	3	
26. NEW KNOWLEDGE: I learned new skills and information.	4	

<u>HOW INTERNSHIP AFFECTED MY ACADEMIC GOALS</u>	(1-5)	Comments
27. FACULTY SPONSOR: was available, supportive, offered good feedback and advice.	5	
28. PROGRAM COORDINATOR: prepared me well for the experience, and helped guide me during my internship.	4	
29. LEARNING CONTRACT: helped my focus on learning; provided helpful structure.	4	

- a) This work experience made my courses at NC A&T State University more meaningful. PLEASE RATE: (YES) (4) 3 2 1 (NO)
- b) This work experience helped me decide to continue in my career choice/major. PLEASE RATE: (YES) 4 3 2 (1) (NO) *I had made this decision prior to my experiences here.*
- c) This work experience convinced me to change my career choice/major. PLEASE RATE: (YES) 4 3 2 (1) (NO)
- d) I worked harder and learned more because I received credit (If applicable). PLEASE RATE: (YES) 4 3 2 (1) (NO)
I received no credit.

PLEASE TAKE A MOMENT TO ANSWER THE FOLLOWING QUESTIONS:

- 1) If you could do this experience again, how would you do it differently?
- ① I would ~~I~~ learn the job description prior to accepting the job. If this ~~job~~ could not be done in a timely manner, I would accept another job. It was by the grace of God that I liked what I did this summer. I saw many interns who weren't as fortunate... some did not have projects when they arrived; they seemed to make them up as they went along.
- ② I would go and befriend every person that I could, learn more about their jobs and responsibilities, and try to tie them in with my life's objectives.

- 2) What did you do in this work experience? I used some of the skills of programming that I acquired in a Production Systems class to program a motor in a specified pattern. I also used DBASE III + training that I had in school as well as through the ITC here to write a DBASE III + program to locate memos that a user is seeking.
- 3) What suggestions do you have for improving the Graduate Intern program?
1. Have a meeting (group) with all graduate interns to tell them what is expected, the pay times, and other pertinent information by the end of the 3rd day of the internship.
 2. Pay the interns on time, so that they can meet their other financial obligations.
 3. Tell the interns what their job descriptions are when they are offered the job, i.e. what their summer duties will consist of.
 4. Communicate more with the mentors. I felt as though I was telling my mentor ~~about~~ ^{my}.
- 4) What would you say to other students about your Graduate Intern experience?
(We may use this for advertising)

I learned many things, and I had the opportunity to put to use some of the knowledge and skills that I attained in school. However, I ~~hardly~~ ^{never} received my pay when I was told that I would, consequently resulting in unnecessary frustration and worry. I would have been a more happy intern had I been paid on time and not had to worry about problems in my budget, due to others' negligence.

- 5) May we use other quotes from this report for advertising purposes?
YES X NO
- as long as you use the entire quote, so as to convey the entire message. (not just part of the ~~thought~~)

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS POSSIBLE.

THANK YOU!!!!!!

- 3) continued...
- what I was supposed to do instead of him informing me of what I was supposed to do. For example, my Branch Head and my Section Head, Rich Mavorick and Tom Heslin, respectively, were not able to attend my talk. Why? Because they both had to be out of the office on that particular day. Had better communication taken place, another day may have been scheduled, or they may have been free and not scheduled anything else.

APPENDIX B

Please return to Dan Krieger, Code 120, as soon as possible.

SUPERVISOR'S EVALUATION
GRADUATE INTERN PROGRAM
North Carolina A&T State University
NASA/Goddard Space Flight Center

A. IDENTIFYING INFORMATION

1. Student's Name: LISA ANTOINE
2. Code/Name of Branch/Section: 513/PROJECT OPERATIONS
BRANCH/OPERATION'S MANAGEMENT AND SUPPORT SECTION

Please provide the following information:

3. Date this form completed: 8/7/91
4. Student's Position Title: _____
5. Supervisor's and/or Mentor's Name: WAYNE GUSTAFSON
6. Supervisor's and/or Mentor's Title: CONTROL CENTER OPERATIONS MANAGER
7. Name and title of person completing this evaluation: JANE

B. STUDENT'S JOB DESCRIPTION

Briefly list the major duties of this student during the Graduate Intern experience. (For this and other questions, please use a separate sheet of paper, if necessary.)

*Use commercial software packages to develop several
S/W routines to assist in operations project.*

C. STUDENT'S WORK EXPERIENCE

Please rate the student's work performance on the characteristics below by circling your responses. If you are unable to rate a particular characteristic because you do not know about the student's performance or the student was not asked to demonstrate the skill or behavior, please circle NA. Please provide comments to clarify your ratings.

	Needs Improvement	Acceptable	Good	Excellent	Not Applicable	
	1	2	3	4	NA	
1. attendance and promptness			1	2	3	(4) NA
2. dependability			1	2	3	(4) NA
3. ability to follow directions well			1	2	3	(4) NA
4. ability to adjust well to changes in tasks			1	2	3	(4) NA
5. ability to work well with others			1	2	3	(4) NA
6. demonstrated desire to learn			1	2	3	(4) NA
7. level of skills necessary to the job			1	2	3	(4) NA
8. evidence of learning new skills on the job			1	2	3	(4) NA
9. demonstrated interest in the whole organization and its mission			1	2	3	(4) NA

10.	ease and creativity in solving problems	1	2	3	(4)	NA
11.	thoroughness and correctness of work	1	2	3	(4)	NA
12.	appropriateness of dress	1	2	3	(4)	NA
13.	ability to handle pressure well and remain calm in crisis situations	1	2	3	(4)	NA
14.	handling of writing assignments required on the job	1	2	3	(4)	NA

COMMENTS:

D. STUDENT'S INTERPERSONAL SKILLS

Please rate the student's ability to interact with others in the office situation. Please provide comments to clarify your ratings.

	Needs Improvement	Acceptable	Good	Excellent		Not Applicable	
	1	2	3	4		NA	
1.	ability to get along with co-workers			1	2	3	(4) NA
2.	willingness to express communication/accessibility needs			1	2	3	(4) NA
3.	willingness to seek and accept feedback from supervisors			1	2	3	(4) NA

COMMENTS:

F. OVERALL RATING OF STUDENT

Please rate the student's overall performance on the factors indicated below.

1. What factors most impressed you about this student?

Desire to perform task.

2. What factors most concerned you about this student?

None

3. What advice would you have regarding suggested courses or specific skills which might help the student prepare him/herself better for his placement or other career field?

none

4. What skills did this student develop or improve during this placement?

She learned several new software packages.

5. If you could, would you consider this student for permanent employment?

☒ Yes, definitely. ☐ Yes, but with reservations
☒ Yes, but student would be more appropriately placed elsewhere in this organization ☐ No

Please indicate why or why not:

He is a very intelligent, well educated, and motivated individual.

G. SUPERVISOR'S EXPERIENCE

1. How long have you worked for this agency? *3 years*

2. Was this your first experience with supervising/mentoring a Graduate Intern student?
☐ Yes ☒ No

If no, how many other Graduate Intern students have you supervised/mentored? *1*

3. Was this your first experience with supervising/mentoring a summer student?
☐ Yes ☒ No

If no, how many other summer students have you supervised/mentored? From which programs? *1*

4. If you answered yes to number 3 above, how did your experience with a Graduate Intern student compare with students from other programs?

She had more years of University Training than previous summer student.

COMMENTS:

5. In what ways could the program improve our services to you and/or the students placed with you?

none

6. Has this report been discussed with the student?
(Please note that our office highly recommends your
discussing this with your Graduate Intern student if at
all possible.)
☒ Yes ☐ No
7. Would you be willing to work with future Graduate
Intern students?
☒ Yes ☐ No

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS
POSSIBLE.

THANK YOU!!!!

Please return to Dan Krieger, Code 120, as soon as possible.

**SUPERVISOR'S EVALUATION
GRADUATE INTERN PROGRAM
North Carolina A&T State University
NASA/Goddard Space Flight Center**

A. IDENTIFYING INFORMATION

1. Student's Name: Mattie Booker
2. Code/Name of Branch/Section: Code 554/Flight Dynamics
Analysis Branch / 554.2

Please provide the following information:

3. Date this form completed: 8/8/91
4. Student's Position Title: Graduate Student
5. Supervisor's and/or Mentor's Name: Evette Brown-Conwe
6. Supervisor's and/or Mentor's Title: Aerospace Engineer
7. Name and title of person completing this evaluation: Dame

B. STUDENT'S JOB DESCRIPTION

Briefly list the major duties of this student during the Graduate Intern experience. (For this and other questions, please use a separate sheet of paper, if necessary.)

Develop a conceptual approach for determining when a spacecraft enters ~~the~~ exists the aurora. She accomplished the job.

C. STUDENT'S WORK EXPERIENCE

Please rate the student's work performance on the characteristics below by circling your responses. If you are unable to rate a particular characteristic because you do not know about the student's performance or the student was not asked to demonstrate the skill or behavior, please circle NA. Please provide comments to clarify your ratings.

Needs Improvement Acceptable Good Excellent Not Applicable

	1	2	3	4	Applicable		
					NA		
1. attendance and promptness				1	2	3	4 NA
2. dependability				1	2	3	4 NA
3. ability to follow directions well				1	2	3	4 NA
4. ability to adjust well to changes in tasks				1	2	3	4 NA
5. ability to work well with others				1	2	3	4 NA
6. demonstrated desire to learn				1	2	3	4 NA
7. level of skills necessary to the job				1	2	3	4 NA
8. evidence of learning new skills on the job				1	2	3	4 NA
9. demonstrated interest in the whole organization and its mission				1	2	3	4 NA

10.	ease and creativity in solving problems	1	2	3	(4)	NA
11.	thoroughness and correctness of work	1	2	3	(4)	NA
12.	appropriateness of dress	1	2	3	(4)	NA
13.	ability to handle pressure well and remain calm in crisis situations	1	2	3	(4)	NA
14.	handling of writing assignments required on the job	1	2	3	(4)	NA

COMMENTS:

D. STUDENT'S INTERPERSONAL SKILLS

Please rate the student's ability to interact with others in the office situation. Please provide comments to clarify your ratings.

Needs Improvement		Acceptable		Good	Excellent	Not Applicable	
1		2		3	4	NA	
1.	ability to get along with co-workers				1 2 3	(4)	NA
2.	willingness to express communication/accessibility needs				1 2 3	(4)	NA
3.	willingness to seek and accept feedback from supervisors, mentor, and associates.				1 2 3	(4)	NA

COMMENTS:

F. OVERALL RATING OF STUDENT

Please rate the student's overall performance on the factors indicated below.

1. What factors most impressed you about this student?

She WAS conscientious about her work and dedicated

2. What factors most concerned you about this student?

None

3. What advice would you have regarding suggested courses or specific skills which might help the student prepare him/herself better for his placement or other career field?

*Maybe a public speaking course.
However she performed well at her presentation.*

4. What skills did this student develop or improve during this placement?

She was able to apply ^{her} analytical skills to a real-life problem. She performed extremely well.

5. If you could, would you consider this student for permanent employment?

☒ Yes, definitely. ☐ Yes, but with reservations
☐ Yes, but student would be more appropriately placed elsewhere in this organization ☐ No

Please indicate why or why not:

G. SUPERVISOR'S EXPERIENCE

1. How long have you worked for this agency?

7.5 yr

2. Was this your first experience with supervising/mentoring a Graduate Intern student?

☒ Yes ☐ No

If no, how many other Graduate Intern students have you supervised/mentored?

3. Was this your first experience with supervising/mentoring a summer student?

☐ Yes ☒ No

If no, how many other summer students have you supervised/mentored? From which programs?

CICA + Shary

4. If you answered yes to number 3 above, how did your experience with a Graduate Intern student compare with students from other programs?

COMMENTS:

5. In what ways could the program improve our services to you and/or the students placed with you?

Leave the shorts, hats, tee-shirts, jeans at home.

Provide students with speech class. Also tell them to dress professionally even though some permanent workers do not. These students are trying to make a good impression. Habits, punctuality and dress are very important.

6. Has this report been discussed with the student?
(Please note that our office highly recommends your
discussing this with your Graduate Intern student if at
all possible.)

☐ Yes ☐ No

7. Would you be willing to work with future Graduate
Intern students?

☒ Yes ☐ No

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS
POSSIBLE.

THANK YOU!!!!

Reviewed by J. Jackson (554.0)

**SUPERVISOR'S EVALUATION
GRADUATE INTERN PROGRAM
North Carolina A&T State University
NASA/Goddard Space Flight Center**

1. Student's Name: LAMARRA. BROWN
2. Code/Name of Branch/Section: 917 / LABORATORY FOR
ATMOSPHERES- ENVIRONMENTAL SENSORS BRANCH

3. Date this form completed: 8/9/91
4. Student's Position Title: SUMMER GRADUATE INTERN
5. Supervisor's and/or Mentor's Name: GEARY SCHWEMMER
6. Supervisor's and/or Mentor's Title: ELECTRONIC ENGINEER
7. Name and title of person completing this evaluation: GEARY SCHWEMMER

STUDENT'S JOB DESCRIPTION
Briefly list the major duties of this student during the Graduate Intern experience. (For this and other questions, please use a separate sheet of paper, if necessary.)

see attached

Please rate the student's work performance on the characteristics below by circling your responses. If you are unable to rate a particular characteristic because you do not know about the student's performance or the student was not asked to demonstrate the skill or behavior, please circle NA. Please provide comments to clarify your ratings.

Needs Improvement Acceptable Good Excellent Not

Circle NA. Please provide comments to clarify your rating.					Not Applicable	
Needs Improvement	Acceptable	Good	Excellent		NA	
1	2	3	4			
1.	attendance and promptness	1	2	3	4	NA
2.	dependability	1	2	3	4	NA
3.	ability to follow directions well	1	2	3	4	NA
4.	ability to adjust well to changes in tasks	1	2	3	4	NA
5.	ability to work well with others	1	2	3	4	NA
6.	demonstrated desire to learn	1	2	3	4	NA
7.	level of skills necessary to the job	1	2	3	4	NA
8.	evidence of learning new skills on the job	1	2	3	4	NA
9.	demonstrated interest in the whole organization and its mission	1	2	3	4	NA

10.	ease and creativity in solving problems	1	(2)	3	4	NA
11.	thoroughness and correctness of work	1	(2)	3	4	NA
12.	appropriateness of dress	1	2	(3)	4	NA
13.	ability to handle pressure well and remain calm in crisis situations	1	2	3	4	(NA)
14.	handling of writing assignments required on the job	1	2	3	4	(NA)

COMMENTS:

D. STUDENT'S INTERPERSONAL SKILLS

Please rate the student's ability to interact with others in the office situation. Please provide comments to clarify your ratings.

	Needs Improvement	Acceptable	Good	Excellent		Not Applicable NA		
	1	2	3	4				
1.	ability to get along with co-workers			1	2	(3)	4	NA
2.	willingness to express communication/accessibility needs			1	(2)	3	4	NA
3.	willingness to seek and accept feedback from supervisors			1	2	(3)	4	NA

COMMENTS:

F. OVERALL RATING OF STUDENT

Please rate the student's overall performance on the factors indicated below.

1. What factors most impressed you about this student?

Willingness to cooperate with others.

2. What factors most concerned you about this student?

Oral Presentation skills.

3. What advice would you have regarding suggested courses or specific skills which might help the student prepare him/herself better for his placement or other career field?

Effective Communications

4. What skills did this student develop or improve during this placement?
ability to work independently without alot of supervision.

5. If you could, would you consider this student for permanent employment?

☐ Yes, definitely. ☐ Yes, but with reservations
☒ Yes, but student would be more appropriately placed elsewhere in this organization ☐ No

Please indicate why or why not:

His solid state physics background is not well matched to our needs for optical, electronic, and atmospheric spectroscopy.

G. SUPERVISOR'S EXPERIENCE

1. How long have you worked for this agency? *15 yrs.*

2. Was this your first experience with supervising/mentoring a Graduate Intern student?
☒ Yes ☒ No

If no, how many other Graduate Intern students have you supervised/mentored?

3. Was this your first experience with supervising/mentoring a summer student?
☐ Yes ☒ No

If no, how many other summer students have you supervised/mentored? From which programs? *~15 from many different programs.*

4. If you answered yes to number 3 above, how did your experience with a Graduate Intern student compare with students from other programs?

On a par with other programs.

COMMENTS:

5. In what ways could the program improve our services to you and/or the students placed with you?

6. Has this report been discussed with the student?
(Please note that our office highly recommends your
discussing this with your Graduate Intern student if at
all possible.)
☒ Yes ☐ No
7. Would you be willing to work with future Graduate
Intern students?
☒ Yes ☐ No

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS
POSSIBLE.

THANK YOU!!!!!!

Graduate Intern Duties

B. Assist lab scientists and engineers in the development and testing of an injection seeded alexandrite laser for atmospheric lidar temperature measurements. This includes laser optical alignment, configuration, and operation; diode laser operation; setting up and running diagnostic instrumentation including laser energy meter, grating spectrometer, and a laser spectrum analyzer. Laser performance tests performed by Mr. Brown include laser wavelength, bandwidth, and frequency stability for various laser configurations. The measurement process includes data acquisition, statistical analysis, and interpretation.

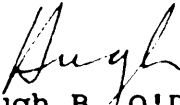
August 26, 1991

TO: 120/Equal Opportunity Office/Mr. Krieger
FROM: 515.2/Head, Simulations Operations Section
SUBJECT: Supervisor's Evaluation/Graduate Intern Program

It was our pleasure this year to provide a project and a mentor for Mr. Carlos De Jesus, a graduate student in Electrical Engineering from the University of Puerto Rico (Mayague).

Mr. John Welch provided the project and functioned as his mentor. Although Carlos is majoring in Control Theory, he was assigned a project in Digital Circuit and Logic Design which is one of our major technical areas. Carlos functioned well and was able to utilize his undergraduate courses and background to handle the challenges of his project. Due to technical problems in our computer aided logic design and testing software, Carlos was not able to complete 100 percent of his project goals. However, he contributed to the isolation and resolution of two of the major deficiencies in the software, but ran out of time to fully complete his project.

Carlos is a skilled engineer with regular attendance and work habits. We would welcome the opportunity to have Carlos work here again, either as an intern or as a new-hire (should the hiring opportunity present itself). We wish him well in the completion of his graduate studies.


Hugh B. O'Donnell

Attachments

1. Position Description
2. Evaluation

cc: Mr. Fahnestock/500
Mr. Dudley/510
Mr. Stanley/515

Summer Intern - Graduate Studies
Electronic Engineer
Computer Engineer

SCOPE

The intern is assigned to the Simulations and Compatibility Test Branch, Simulations Operations Section, Code 515.2. The intern will be assigned a project and a mentor within the section, during the summer, 1991.

The section is responsible for the development and operation of computed based simulators and computer communications interfaces utilized to test and verify Mission Operations and Data Systems Directorate (MO&DSD) systems for flight project support, and ground system development and testing.

MAJOR DUTIES

The intern assists section engineers in designing, developing, and testing digital electronic circuitry for computer based simulators and communications interfaces. The circuitry is implemented using Computer Aided Design (CAD) tools and Programmable Logic Devices and Arrays (Erasable) called EPLD's and EPLA's.

- Operates CAD tools and testing tools
- Designs logic circuitry for EPLD/EPLA implementation
- Performs trouble shooting and fault isolation on designs before and after implementation on circuit board
- Performs wire-wrapping and solder assembly of test boards
- Assists section engineers in simulations and test operations
- Documents and completes his/her intern project and project report
- Presents project results for peer and management review

KNOWLEDGE REQUIRED BY THE POSITION

- Knowledge of electronic engineering and circuit principles
- Knowledge of digital logic and computer fundamentals
- Knowledge of basic electronics lab techniques

An undergraduate degree in electronic or computer engineering is required.

SUPERVISORY CONTROLS

The intern works under the supervision of the Section Head and directly under a mentor assigned by the section head.

GUIDELINES

Guidelines are provided by the graduate intern program (N.C. A&T University/S.I.C.A.) and by NASA personnel regulations governing temporary employees, interns and trainees.

COMPLEXITY

The intern is required to exercise initiative and judgement, based on knowledge and experience in the field of electronics and digital/computer circuitry.

The intern must have a knowledge of personal computers, DOS and common PC software for engineering design, word processing and graphics.

The intern must have a desire and the ability to learn new approaches and techniques in his/her field.

The intern must have the ability to communicate effectively orally and in writing.

SCOPE AND EFFECT

N/A

PERSONAL CONTACTS

Section, Branch and MO&DSD personnel; contractor personnel and intern program coordinators for work/job related matters.

The intern meets with program coordinators, supervisors, mentors, center and MO&DSD management as appropriate for reviews, presentations and orientations.

PHYSICAL DEMANDS AND WORK ENVIRONMENT

The work is largely sedentary, involving computer terminals, PC's and electronic test equipment in a laboratory or office environment. Some walking is required between buildings and between office and laboratory areas.

WJD
8/15/91

Please return to Dan Krieger, Code 120, as soon as possible.

SUPERVISOR'S EVALUATION
GRADUATE INTERN PROGRAM
North Carolina A&T State University
NASA/Goddard Space Flight Center

A. IDENTIFYING INFORMATION

1. Student's Name: Carlos De Jesus
2. Code/Name of Branch/Section: simulations operations
Section, Code SIS.2

Mentor: John P. Welch / SIS.2

Please provide the following information:

3. Date this form completed: 8/13/91
4. Student's Position Title: SICA Summer Intern, Electrical Engineer
5. Supervisor's and/or Mentor's Name: Hugh B. O'Donnell / John P. Welch
6. Supervisor's and/or Mentor's Title: Head simulations operations Section
7. Name and title of person completing this evaluation:
Hugh B. O'Donnell, Head Simulations Operations Section, Code
SIS.2.

B. STUDENT'S JOB DESCRIPTION

Briefly list the major duties of this student during the Graduate Intern experience. (For this and other questions, please use a separate sheet of paper, if necessary.)

C. STUDENT'S WORK EXPERIENCE

Please rate the student's work performance on the characteristics below by circling your responses. If you are unable to rate a particular characteristic because you do not know about the student's performance or the student was not asked to demonstrate the skill or behavior, please circle NA. Please provide comments to clarify your ratings.

	Needs Improvement	Acceptable	Good	Excellent	Not Applicable
	1	2	3	4	NA
1. attendance and promptness			1	2	3 (4) NA
2. dependability			1	2	3 (4) NA
3. ability to follow directions well			1	2	3 (4) NA
4. ability to adjust well to changes in tasks			1	2	3 (4) NA
5. ability to work well with others			1	2	3 (4) NA
6. demonstrated desire to learn			1	2	3 (4) NA
7. level of skills necessary to the job			1	2	3 (4) NA
8. evidence of learning new skills on the job			1	2	3 (4) NA
9. demonstrated interest in the whole organization and its mission			1	2	3 (4) NA

ATTACHMENT 2

- | | | | | | | |
|-----|--|---|---|---|-----|----|
| 10. | ease and creativity in solving problems | 1 | 2 | 3 | (4) | NA |
| 11. | thoroughness and correctness of work | 1 | 2 | 3 | (4) | NA |
| 12. | appropriateness of dress | 1 | 2 | 3 | (4) | NA |
| 13. | ability to handle pressure well and remain calm in crisis situations | 1 | 2 | 3 | (4) | NA |
| 14. | handling of writing assignments required on the job | 1 | 2 | 3 | (4) | NA |

COMMENTS: Despite an initial language handicap, which gradually improved during his stay, Carlos adjusted well, accepted the challenge of his summer project and performed extremely well.

D.

STUDENT'S INTERPERSONAL SKILLS

Please rate the student's ability to interact with others in the office situation. Please provide comments to clarify your ratings.

- | | Needs Improvement | Acceptable | Good | Excellent | Not Applicable | | |
|----|--|------------|------|-----------|----------------|-----|--------|
| | 1 | 2 | 3 | 4 | NA | | |
| 1. | ability to get along with co-workers | | | 1 | 2 | 3 | (4) NA |
| 2. | willingness to express communication/accessibility needs | | | 1 | 2 | (3) | 4 NA |
| 3. | willingness to seek and accept feedback from supervisors | | | 1 | 2 | 3 | (4) NA |

COMMENTS:

None

F. OVERALL RATING OF STUDENT

Please rate the student's overall performance on the factors indicated below.

1. What factors most impressed you about this student?

While a graduate student majoring in Control Theory, Carlos was able to function well in a digital circuit design environment.

2. What factors most concerned you about this student?

None

3. What advice would you have regarding suggested courses or specific skills which might help the student prepare him/herself better for his placement or other career field?

None

4. What skills did this student develop or improve during this placement? *His language skills and writing skills in English.*

5. If you could, would you consider this student for permanent employment?

☒ Yes, definitely. ☐ Yes, but with reservations
☐ Yes, but student would be more appropriately placed elsewhere in this organization ☐ No

Please indicate why or why not:

G. SUPERVISOR'S EXPERIENCE

1. How long have you worked for this agency? *19 years*
2. Was this your first experience with supervising/mentoring a Graduate Intern student?
☐ Yes ☒ No

If no, how many other Graduate Intern students have you supervised/mentored? *3*

3. Was this your first experience with supervising/mentoring a summer student?
☐ Yes ☒ No

If no, how many other summer students have you supervised/mentored? From which programs? *Many - SHARP, SICA, LASER, NAT. SPACE CLUB, WISE.*

4. If you answered yes to number 3 above, how did your experience with a Graduate Intern student compare with students from other programs? *Very favorably. Graduate students are generally more independent, with more maturity (older, more educated) than high school students.*

COMMENTS:

5. In what ways could the program improve our services to you and/or the students placed with you?

I can't think of any - except that perhaps a better match could be made between Intern and assigned organization as to degree/specialty and work. Perhaps this could be done by ~~more~~ involving a greater number of Center organizations in summer programs.

6. Has this report been discussed with the student?
(Please note that our office highly recommends your discussing this with your Graduate Intern student if at all possible.)
☒ Yes ☐ No *Partially - It was not completed until after Carlos had departed*
7. Would you be willing to work with future Graduate Intern students?
☒ Yes ☐ No

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS POSSIBLE.

THANK YOU!!!!

Please return to Dan Krieger, Code 120, as soon as possible.

**SUPERVISOR'S EVALUATION
GRADUATE INTERN PROGRAM
North Carolina A&T State University
NASA/Goddard Space Flight Center**

A. IDENTIFYING INFORMATION

1. Student's Name: Lisa Foster
2. Code/Name of Branch/Section: Code 532.3 Network Control
Systems Branch, Network Software Section

Please provide the following information:

3. Date this form completed: 8/7/91
4. Student's Position Title: Summer Intern
5. Supervisor's and/or Mentor's Name: Eric Richmond
6. Supervisor's and/or Mentor's Title: Computer Engineer
7. Name and title of person completing this evaluation: SAME AS ABOVE

B. STUDENT'S JOB DESCRIPTION

Briefly list the major duties of this student during the Graduate Intern experience. (For this and other questions, please use a separate sheet of paper, if necessary.)

Use mathematical techniques to model the NASA Space Network.

C. STUDENT'S WORK EXPERIENCE

Please rate the student's work performance on the characteristics below by circling your responses. If you are unable to rate a particular characteristic because you do not know about the student's performance or the student was not asked to demonstrate the skill or behavior, please circle NA. Please provide comments to clarify your ratings.

	Needs Improvement	Acceptable	Good	Excellent	Not Applicable	
	1	2	3	4	NA	
1. attendance and promptness			1	2	3	④ NA
2. dependability			1	2	3	④ NA
3. ability to follow directions well	1		2	3	④	NA
4. ability to adjust well to changes in tasks	1		2	3	④	NA
5. ability to work well with others	1		2	3	④	NA
6. demonstrated desire to learn	1		2	3	④	NA
7. level of skills necessary to the job	1		2	③	4	NA
8. evidence of learning new skills on the job	1		2	③	4	NA
9. demonstrated interest in the whole organization and its mission	1		2	3	④	NA

10.	ease and creativity in solving problems	1	2	(3)	4	NA
11.	thoroughness and correctness of work	1	2	(3)	4	NA
12.	appropriateness of dress	1	2	(3)	4	NA
13.	ability to handle pressure well and remain calm in crisis situations	1	2	(3)	4	NA
14.	handling of writing assignments required on the job	1	2	(3)	4	NA

COMMENTS:

I think Lisa handled the adjustment to a NASA work environment very well

D. STUDENT'S INTERPERSONAL SKILLS

Please rate the student's ability to interact with others in the office situation. Please provide comments to clarify your ratings.

		Needs Improvement		Acceptable		Good		Excellent		Not Applicable	
		1		2		3		4		NA	
1.	ability to get along with co-workers							1	2	(3)	(4) NA
2.	willingness to express communication/accessibility needs							1	2	(3)	4 NA
3.	willingness to seek and accept feedback from supervisors							1	2	(3)	(4) NA

COMMENTS:

F. OVERALL RATING OF STUDENT

Please rate the student's overall performance on the factors indicated below.

- What factors most impressed you about this student?
Her enthusiasm to learn about NASA and applying mathematics to a real system
- What factors most concerned you about this student?
Her concentration needs to improve
- What advice would you have regarding suggested courses or specific skills which might help the student prepare him/herself better for his placement or other career field?
Presentation skills

4. What skills did this student develop or improve during this placement?

linear programming applicability

5. If you could, would you consider this student for permanent employment?

☒ Yes, definitely. ☐ Yes, but with reservations
☐ Yes, but student would be more appropriately placed elsewhere in this organization ☐ No

Please indicate why or why not:

she is mathematically competent, but it her enthusiasm for solving problems make her more attractive

G. SUPERVISOR'S EXPERIENCE

1. How long have you worked for this agency? *5 years*

2. Was this your first experience with supervising/mentoring a Graduate Intern student?

☒ Yes ☐ No

If no, how many other Graduate Intern students have you supervised/mentored?

3. Was this your first experience with supervising/mentoring a summer student?

☐ Yes ☒ No

If no, how many other summer students have you supervised/mentored? From which programs?

4. If you answered yes to number 3 above, how did your experience with a Graduate Intern student compare with students from other programs?

N/A

COMMENTS:

5. In what ways could the program improve our services to you and/or the students placed with you?

a complete schedule of events for the program before students arrive

6. Has this report been discussed with the student?
(Please note that our office highly recommends your
discussing this with your Graduate Intern student if at
all possible.)
☒ Yes ☐ No
7. Would you be willing to work with future Graduate
Intern students?
☒ Yes ☐ No

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS
POSSIBLE.

THANK YOU!!!!!!

Please return to Dan Krieger, Code 120, as soon as possible.

**SUPERVISOR'S EVALUATION
GRADUATE INTERN PROGRAM
North Carolina A&T State University
NASA/Goddard Space Flight Center**

A. IDENTIFYING INFORMATION

1. Student's Name: JESSE JOHNSON
2. Code/Name of Branch/Section: 152 / RESOURCE ANALYSIS Office

Please provide the following information:

3. Date this form completed: 8 AUGUST 1991
4. Student's Position Title: O. R. ANALYST
5. Supervisor's and/or Mentor's Name: BERNARD DIXON
6. Supervisor's and/or Mentor's Title: SUPV O. R. ANALYST
7. Name and title of person completing this evaluation: BERNARD DIXON, SUPV. O. R. ANALYST

B. STUDENT'S JOB DESCRIPTION

Briefly list the major duties of this student during the Graduate Intern experience. (For this and other questions, please use a separate sheet of paper, if necessary.)

Complete AND SUMMARIZE RESEARCH NOTES ON

C. STUDENT'S WORK EXPERIENCE

Please rate the student's work performance on the characteristics below by circling your responses. If you are unable to rate a particular characteristic because you do not know about the student's performance or the student was not asked to demonstrate the skill or behavior, please circle NA. Please provide comments to clarify your ratings.

	Needs Improvement	Acceptable	Good	Excellent	Not Applicable
	1	2	3	4	NA
1. attendance and promptness			1	2	3 4 NA
2. dependability			1	2	3 4 NA
3. ability to follow directions well			1	2	3 4 NA
4. ability to adjust well to changes in tasks			1	2	3 4 NA
5. ability to work well with others			1	2	3 4 NA
6. demonstrated desire to learn			1	2	3 4 NA
7. level of skills necessary to the job			1	2	3 4 NA
8. evidence of learning new skills on the job			1	2	3 4 NA
9. demonstrated interest in the whole organization and its mission			1	2	3 4 NA

10.	ease and creativity in solving problems	1	2	3	(4)	NA
11.	thoroughness and correctness of work	1	2	3	(4)	NA
12.	appropriateness of dress	1	2	(3)	4	NA
13.	ability to handle pressure well and remain calm in crisis situations	1	2	3	(4)	NA
14.	handling of writing assignments required on the job	1	2	3	(4)	NA

COMMENTS:

D. STUDENT'S INTERPERSONAL SKILLS

Please rate the student's ability to interact with others in the office situation. Please provide comments to clarify your ratings.

your ratings:						Not	
Needs Improvement	Acceptable	Good	Excellent		Applicable		
1	2	3	4		NA		
1.	ability to get along with co-workers			1	2	3	(4) NA
2.	willingness to express communication/accessibility needs			1	2	3	(4) NA
3.	willingness to seek and accept feedback from supervisors			1	2	3	(4) NA

COMMENTS:

F. OVERALL RATING OF STUDENT

Please rate the student's overall performance on the factors indicated below.

- What factors most impressed you about this student?
JOHNSON has Significant Skills And DETERMINATION. He will be a VALUABLE ASSET to Some Organization.
- What factors most concerned you about this student?
None
- What advice would you have regarding suggested courses or specific skills which might help the student prepare him/herself better for his placement or other career field?

4. What skills did this student develop or improve during this placement?

5. If you could, would you consider this student for permanent employment?

☒ Yes, definitely. ☐ Yes, but with reservations
☐ Yes, but student would be more appropriately placed elsewhere in this organization ☐ No

Please indicate why or why not.

He is fully capable of making a significant contribution now.

G. SUPERVISOR'S EXPERIENCE

1. How long have you worked for this agency? *24 yrs.*

2. Was this your first experience with supervising/mentoring a Graduate Intern student?
☐ Yes ☒ No

If no, how many other Graduate Intern students have you supervised/mentored?

3. Was this your first experience with supervising/mentoring a summer student?
☐ Yes ☒ No

If no, how many other summer students have you supervised/mentored? From which programs?

4. If you answered yes to number 3 above, how did your experience with a Graduate Intern student compare with students from other programs?

COMMENTS:

5. In what ways could the program improve our services to you and/or the students placed with you?

6. Has this report been discussed with the student?
(Please note that our office highly recommends your
discussing this with your Graduate Intern student if at
all possible.)
____ Yes ____ No
7. Would you be willing to work with future Graduate
Intern students?
 / Yes ____ No

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS
POSSIBLE.

THANK YOU!!!!!!

**SUPERVISOR'S EVALUATION
GRADUATE INTERN PROGRAM
North Carolina A&T State University
NASA/Goddard Space Flight Center**

A. IDENTIFYING INFORMATION

1. Student's Name: B. Curtis Turner
2. Code/Name of Branch/Section: 936 / Science Information Systems Center

Please provide the following information:

3. Date this form completed: 3/27/92
4. Student's Position Title: _____
5. Supervisor's and/or Mentor's Name: Dr. N.L. Bonavito
6. Supervisor's and/or Mentor's Title: Staff Scientist
7. Name and title of person completing this evaluation: Dr. N.L. Bonavito

B. STUDENT'S JOB DESCRIPTION

Briefly list the major duties of this student during the Graduate Intern experience. (For this and other questions, please use a separate sheet of paper, if necessary.)

- Computer Programmer
- Analyst (Science)

C. STUDENT'S WORK EXPERIENCE

Please rate the student's work performance on the characteristics below by circling your responses. If you are unable to rate a particular characteristic because you do not know about the student's performance or the student was not asked to demonstrate the skill or behavior, please circle NA. Please provide comments to clarify your ratings.

Needs Improvement Acceptable Good Excellent Not Applicable

	1	2	3	4	NA
1. attendance and promptness				3	4 NA
2. dependability				3	4 NA
3. ability to follow directions well				3	4 NA
4. ability to adjust well to changes in tasks				3	4 NA
5. ability to work well with others				3	4 NA
6. demonstrated desire to learn				3	4 NA
7. level of skills necessary to the job				3	4 NA
8. evidence of learning new skills on the job				3	4 NA
9. demonstrated interest in the whole organization and its mission				3	4 NA

10.	ease and creativity in solving problems	1	2	3	4	NA
11.	thoroughness and correctness of work	1	2	3	4	NA
12.	appropriateness of dress	1	2	3	4	NA
13.	ability to handle pressure well and remain calm in crisis situations	1	2	3	4	NA
14.	handling of writing assignments required on the job	1	2	3	4	NA

COMMENTS:

Very impressed with Mr. Turner's work.

D. STUDENT'S INTERPERSONAL SKILLS

Please rate the student's ability to interact with others in the office situation. Please provide comments to clarify your ratings.

your ratings.					Not		
Needs Improvement	Acceptable	Good	Excellent	Applicable			
1	2	3	4	NA			
1.	ability to get along with co-workers		1	2	3	4	NA
2.	willingness to express communication/accessibility needs		1	2	3	4	NA
3.	willingness to seek and accept feedback from supervisors		1	2	3	4	NA

COMMENTS:

Mr. Turner was well liked by all Code 930 personnel.

F. OVERALL RATING OF STUDENT

Please rate the student's overall performance on the factors indicated below.

1. What factors most impressed you about this student?

- Eagerness to learn*
- Interest in his field and in our work*

2. What factors most concerned you about this student?

NONE

3. What advice would you have regarding suggested courses or specific skills which might help the student prepare him/herself better for his placement or other career field?

Continue for the advanced degree.

4. What skills did this student develop or improve during this placement?

Improved understanding of Statistical Mechanics

5. If you could, would you consider this student for permanent employment?

☒ Yes, definitely. ☐ Yes, but with reservations
☐ Yes, but student would be more appropriately placed elsewhere in this organization ☐ No

Please indicate why or why not:

He is now well versed in the discipline of data processing and understanding.

G. SUPERVISOR'S EXPERIENCE

1. How long have you worked for this agency? *30 years*
2. Was this your first experience with supervising/mentoring a Graduate Intern student?
☐ Yes ☒ No

If no, how many other Graduate Intern students have you supervised/mentored? *3*

3. Was this your first experience with supervising/mentoring a summer student?
☒ Yes ☐ No

If no, how many other summer students have you supervised/mentored? From which programs?

4. If you answered yes to number 3 above, how did your experience with a Graduate Intern student compare with students from other programs?

Mr. Turner's interests and talents are more in line with Division 930's mission

COMMENTS:

Mr. Turner's education in Statistical Physics provides an ideal match for NASA's information processing programs.

5. In what ways could the program improve our services to you and/or the students placed with you?

Mr. Turner is ideally suited for his supervisor's programs and consequently, it may be difficult to equate to him.

6. Has this report been discussed with the student?
(Please note that our office highly recommends your discussing this with your Graduate Intern student if at all possible.)

☒ Yes ☐ No *To a degree.*

7. Would you be willing to work with future Graduate Intern students?

☒ Yes ☐ No



THANK YOU!!!!!!

*Only if they match the qualifications of
Mr. B. Curtis Turner.*

Please return to Dan Krieger, Code 120, as soon as possible.

**SUPERVISOR'S EVALUATION
GRADUATE INTERN PROGRAM
North Carolina A&T State University
NASA/Goddard Space Flight Center**

A. IDENTIFYING INFORMATION

1. Student's Name: WALTHER YARBROUGH
2. Code/Name of Branch/Section: CODE 313 - MATERIALS BRANCH - CERAMICS SECTION

Please provide the following information:

3. Date this form completed: AUGUST 9, 1991
4. Student's Position Title: GRADUATE INTERN
5. Supervisor's and/or Mentor's Name: CHARLES POWERS
6. Supervisor's and/or Mentor's Title: ELECTRONICS ENGINEER
7. Name and title of person completing this evaluation: CHARLES POWERS, ELECTRONICS ENGINEER

B. STUDENT'S JOB DESCRIPTION

Briefly list the major duties of this student during the Graduate Intern experience. (For this and other questions, please use a separate sheet of paper, if necessary.)

- INTERFACE AND PROGRAM A MOTOR CONTROLLER FOR THE AMSU-AZ BEARING LIFE TEST.

- DEVELOP A DBASE III+ PROGRAM FOR USE WITH THE CODE 313 MEMO BANK

INDEX.

C. STUDENT'S WORK EXPERIENCE

Please rate the student's work performance on the characteristics below by circling your responses. If you are unable to rate a particular characteristic because you do not know about the student's performance or the student was not asked to demonstrate the skill or behavior, please circle NA. Please provide comments to clarify your ratings.

	Needs Improvement	Acceptable	Good	Excellent	Not Applicable	
	1	2	3	4	NA	
1. attendance and promptness			1	2	3	(4) NA
2. dependability			1	2	3	(4) NA
3. ability to follow directions well			1	2	3	(4) NA
4. ability to adjust well to changes in tasks			1	2	(3)	4 NA
5. ability to work well with others			1	2	(3)	4 NA
6. demonstrated desire to learn			1	2	3	(4) NA
7. level of skills necessary to the job			1	2	3	(4) NA
8. evidence of learning new skills on the job			1	2	3	(4) NA
9. demonstrated interest in the whole organization and its mission			1	2	(3)	4 NA

10.	ease and creativity in solving problems	1	2	(3)	4	NA
11.	thoroughness and correctness of work	1	2	(3)	4	NA
12.	appropriateness of dress	1	2	3	(4)	NA
13.	ability to handle pressure well and remain calm in crisis situations	1	2	(3)	4	NA
14.	handling of writing assignments required on the job	1	2	3	(4)	NA

COMMENTS:

D. STUDENT'S INTERPERSONAL SKILLS

Please rate the student's ability to interact with others in the office situation. Please provide comments to clarify your ratings.

	Needs Improvement	Acceptable	Good	Excellent		Not Applicable NA
	1	2	3	4		
1.	ability to get along with co-workers			1	2	(3) 4 NA
2.	willingness to express communication/accessibility needs			1	2	(3) 4 NA
3.	willingness to seek and accept feedback from supervisors			1	2	3 (4) NA

COMMENTS:

F. OVERALL RATING OF STUDENT

Please rate the student's overall performance on the factors indicated below.

- What factors most impressed you about this student?
HER WILLINGNESS TO ASK FOR DIRECTION OR HELP IF SHE WAS HAVING TROUBLE OR DID NOT UNDERSTAND THE TASK ASSIGNED TO HER.
- What factors most concerned you about this student?
SHE COULD USE MORE LABORATORY EXPERIENCE, WHICH IS TYPICAL OF MOST STUDENTS.
- What advice would you have regarding suggested courses or specific skills which might help the student prepare him/herself better for his placement or other career field?
IF SHE IS INTERESTED IN MATERIAL ENGINEERING, MORE COURSES IN MATERIALS AND LABORATORY TECHNIQUES.

4. What skills did this student develop or improve during this placement?
SHE DEVELOPED HER UNDERSTANDING OF SERVO-CONTROL AND MECHANISMS. SHE ALSO IMPROVED HER DBASE III + PROGRAMMING SK.
5. If you could, would you consider this student for permanent employment?
- ☒ Yes, definitely. ☐ Yes, but with reservations
☐ Yes, but student would be more appropriately placed elsewhere in this organization ☐ No

Please indicate why or why not:

G. SUPERVISOR'S EXPERIENCE

1. How long have you worked for this agency? 8 YEARS.
2. Was this your first experience with supervising/mentoring a Graduate Intern student?
☒ Yes ☐ No

If no, how many other Graduate Intern students have you supervised/mentored?

3. Was this your first experience with supervising/mentoring a summer student?
☐ Yes ☒ No

If no, how many other summer students have you supervised/mentored? From which programs? TWO, SICA

4. If you answered ^{no} yes to number 3 above, how did your experience with a Graduate Intern student compare with students from other programs?

THE GI student REQUIRED LESS DIRECTION, AND WAS ABLE TO WORK ~~INDEPENDENTLY~~ INDEPENDENTLY.

COMMENTS:

5. In what ways could the program improve our services to you and/or the students placed with you?
- MORE COMMUNICATIONS WITH THE MENTORS,
PERHAPS A SMALL HANDBOOK FOR THE MENTOR AND STUDENT DESCRIBING THE PROGRAM.

6. Has this report been discussed with the student?
(Please note that our office highly recommends your
discussing this with your Graduate Intern student if at
all possible.)
 X Yes No
7. Would you be willing to work with future Graduate
Intern students?
 X Yes No

PLEASE RETURN THIS FORM TO DAN KRIEGER, CODE 120, AS SOON AS
POSSIBLE.

THANK YOU!!!!!!

APPENDIX C

7/01
5/4/90
N92-23959-10

USING MICROSOFT EXCEL APPLICATIONS

IN

W 3086518
THE GRADUATE INTERN PROGRAM
AT
GODDARD SPACE FLIGHT CENTER

JUNE 3, 1991 - AUGUST 9, 1991

BY

LISA ANTOINE

MASTER OF SCIENCE CANDIDATE IN
ELECTRICAL ENGINEERING AT
NORTH CAROLINA AGRICULTURAL &
TECHNICAL STATE UNIVERSITY

OUTLINE

- I. MISSION OPERATIONS AND DATA SYSTEMS (CODE 500)
 - A. PRINCIPLE FUNCTIONS
- II. MISSION OPERATIONS DIVISION (CODE 510)
 - A. PRINCIPLE FUNCTIONS
- III. PROJECT OPERATIONS BRANCH (CODE 513)
 - A. PRINCIPLE FUNCTIONS
- IV. MY CONTRIBUTION TO THE NASA MISSION
 - A. DEVELOPMENT OF THE XTRACTOR MACRO FOR THE RUST
 - B. DEVELOPMENT OF THE BARGRAF MACRO FOR THE RUST
 - C. SELF-PACED TRAINING COURSE COMPLETIONS INCLUDE
 - 1. PROFESSOR MAC
 - 2. HYPEREASY #1 - #4
 - 3. MICROSOFT EXCEL
- V. MICROSOFT EXCEL
 - A. FUNCTIONS
- VI. RUST
 - A. DEFINITION
 - B. PURPOSE
- VII. XTRACTOR MACRO
- VIII. BARGRAF MACRO
- IX. RECOMMENDATIONS AND CONCLUSION

During the ten-week program at Goddard Space Flight Center I worked in code 513, the Project Operations Branch, which is a branch in the Mission Operations Division, code 510. The Mission Operations Division is a division of code 500, Mission Operations and Data Systems. Code 500, Mission Operations and Data Systems, is directed by Dale L. Fahnestock. Code 500 is responsible for the planning, designing, development, and operation of spaceflight tracking and communications networks and data systems support for near-flight spaceflight missions. Also, code 500 ensures that space and ground communications network and end-to-end data systems meet mission support requirements and are maintained at the state-of-the-art.

Carroll G. Dudley is the Chief of the Mission Operations Division, code 510. The functions of the Mission Operations Division include designing, developing, operating and maintaining the Goddard Space Flight Operations and Payload Operations Control Centers (POCC), operating computer facilities on which related software systems reside, designing, developing, and maintaining operational flight software executed on-board spacecraft as an integral part of the total data systems, and providing simulator system resident on portable computers and large-scale computer systems.

Vicki L. Oxenham is the head of the Project Operations Branch, code 513, which is responsible for requirements, design, development, and conduct of full data system simulations and tests, develops, plans, and directs activities of all system elements and end users, serves as an interface for operations planning and management, performs mission analysis of present and future project POCC requirements and equates these to resource needs.

My contributions to the mission of the Project Operations Branch, code 513, included the development of the Xtractor and Bargraf macros for the Remote User Scheduling Terminal (RUST) using Microsoft Excel. Because of little to no experience with the MacIntosh, I took three training courses to become familiar with MacIntosh, which is a complex combination of computer hardware and software working together. Hypereasy is a software designed to help computer owners accomplish business or personal tasks. Hypereasy programming involves creating scripts, which are attached to objects which are placed on cards.

Microsoft Excel is a software that allows the user to create labels and formulas, format worksheets, paste formulas and arguments, link worksheets, use built-in formulas, create charts, print worksheets and charts, and plan, record, and run macros.

The Deep Space Network (DSN) Remote User Scheduling Terminal is a personal computer-based system designed to assist Goddard projects in the planning and scheduling of DSN resources for Goddard missions unable to use the Tracking and Data Relay Satellite System. The DSN RUST is the Goddard interface to the Jet Propulsion Laboratory Network Scheduling System. The RUST replaces the Jet Propulsion Laboratory (JPL) Mission Planning Terminal System effort.

JPL determines the time of day that a satellite will be in close vicinity of a particular antenna. Thereafter, a one-week strawman's schedule, which is a composite schedule for the 26-meter network for a 7-day period, may be obtained from the RUST. Data can be transmitted from satellite to control centers through an antenna.

Currently, the minimum DSN RUST system hardware consists of an IBM PC AT clone with 5.25 inch floppy disk drives, an internal hard disk drive, and internal 2400 Baud Modem, a high resolution video interface and monitor and a parallel printer interface and printer. Currently, the DSN RUST software consists of five subsystems. These subsystems are:

- a. Menu-Executive controls the display of the user-selectable menus.
- b. Enter controls the forms for data input.
- c. Editing Menu Executive provides the editing function.
- d. Token to page performs the formatting function for the display, print, and transmit information.
- e. Pick allows the user to delete an unwanted request.

In the near future the RUST will be implemented on the MacIntosh. Upon implementation of the MacIntosh RUST macros, which are programs that Microsoft Excel follows to carry out tasks or calculations, may be used to further automate the process of data retrieval keeping with the latest innovations. The Xtractor macro is designed to perform query extracts from the RUST database to the report section depending on the selection criteria. To utilize the Xtractor macro, which is shown in figure 1, the operator should follow these twelve steps:

1. Open Microsoft Excel
2. Open the RUST file
3. Set the criteria by entering the day, start, beginning of track, end

of track, and, and the user

4. Paint the criteria
5. Select the Data Set Criteria Command
6. Paint the RUST database
7. Select Data Set Database
8. Paint the Extract Range, which is P8 to U36
9. Select Formula Define Name
10. Choose QU_OUT
11. Open the Xtractor file
12. Select the Macro Run Command

The requested data is extracted from the RUST database and placed in the report section.

The Bargraf Macro, which is shown in figure 2, activates the RUST worksheet data range to automatically generate a bar graph with the data legend. To utilize the Bargraf macro the operator should follow these five steps:

1. Open the Bargraf file
2. On the RUST file, paint the extracted data to be graphed
3. Select the Define Name Command and type graph_rng
4. Click on the Bargraf Macro
5. Select Macro Run

A bar graph of the extracted data is generated with the data legend.

XTRACTOR

	A
1	RUST XTRACTOR
2	PERFORMS EXTRACT FROM THE RUST DATABASE
3	DEPENDING ON THE SELECTION CRITERIA
4	=ACTIVATE("RUST")
5	=ALERT("WELCOME TO THE REMOTE USER SCHEDULING TEMINAL",2)
6	=ALERT("MICROSOFT EXCEL ALLOWS THE OPERATOR TO RETRIEVE DATA ",2)
7	=ECHO(FALSE)
8	=FORMULA.GOTO("QU_OUT")
9	=VLINE(1)
10	=MESSAGE(TRUE,"DATA EXTRACT IN PROGRESS ...")
11	=EXTRACT?()
12	=RETURN()

BARGRAF

	A
1	Graphics Macros
2	
3	COLUMN1
4	COLUMN GRAPH WITH LEGEND
5	=ACTIVATE("RUST")
6	=ECHO(FALSE)
7	=SELECT("graph_rng")
8	=NEW(2)
9	=MOVE(22,63)
10	=SIZE(478,288)
11	=LEGEND(TRUE)
12	=ECHO(TRUE)
13	=GALLERY.COLUMN(4)
14	=RETURN()

Figure 2

RECOMMENDATIONS AND CONCLUSIONS

For future improvements on the XTRACTOR and BARGRAF macro I recommend the following:

1. Implement the autoexec mode for the XTRACTOR AND BARGRAF macro so that when the RUST database is opened the XTRACTOR and BARGRAF macros are activated simultaneously.
2. Implement a dialog box that would allow the user to select the criteria from a menu.
3. Update the macros to give the user the option to exit the database.
4. Update the Bargraf macro to create a horizontal bar graph.

The following books, which may be obtained through the interlibrary loan system at the Goddard Library, may be useful in updating the XTRACTOR and BARGRAF macros:

1. Excel Macro Library by Mary V. Campbell
2. The Complete Book of Excel Macros by Louis Benjamin
3. Microsoft Excel with Macros by Douglas Hergert

In conclusion, my summer at Goddard Space Flight Center was an interesting, enlightening, and significant experience. My training courses at the ITC building enhanced my MacIntosh skills. A project, that was challenging and meaningful, was provided for me during the summer. The Goddard Library was efficient in providing me with the necessary books to complete my project. The people in Code 513 were extremely helpful and friendly for the duration of this program. It was a good summer!

MATTIE BOOKER
FAST AURORA ZONE ANALYSIS
FLIGHT DYNAMICS DIVISION
CODE 554.2
AUGUST 7, 1991

W.C. Lee
8/8/91
JC 2970 546
N92-23960
81451
p.19

I. INTRODUCTION

THE FLIGHT DYNAMICS FACILITY (FDF) OF THE FLIGHT DYNAMICS DIVISION (FDD), CODE 550 OF THE GODDARD SPACE FLIGHT CENTER PROVIDES ACQUISITION DATA TO TRACKING STATIONS AND ORBIT AND ATTITUDE PRODUCTS AND SERVICES TO SCIENTISTS AND MISSION SUPPORT ELEMENTS. IT ALSO PERFORMS ORBIT AND ATTITUDE DETERMINATION AND ANALYSIS. I WAS ASSIGNED TO SPEND MY SUMMER AS A MEMBER OF THE NORTH CAROLINA A & T GRADUATE INTERN PROGRAM AND WORK ON A PROJECT THAT WOULD BE OF MUTUAL BENEFIT TO ME AS A STUDENT AND TO NASA PERSONNEL. MY PROJECT WAS TO DETERMINE A METHOD TO USE TO FIND THE SPACECRAFT ENTRY AND EXIT TIMES OF THE AURORA ZONE. TO GET FAMILIAR WITH THE INFORMATION, I READ VARIOUS BOOKS ON THE AURORA, AND ORBIT DETERMINATIONS. ONE OF THE BOOKS CALLED "SPACECRAFT ATTITUDE DETERMINATION AND CONTROL" BY JAMES R. WERTZ, HELPED ME TO GET FAMILIAR WITH THE TERMINOLOGY AND MATHEMATICAL EQUATIONS USED FOR MY PROJECT.

II. BACKGROUND INFORMATION

THE FAST AURORAL SNAPSHOT TELESCOPE (FAST) IS THE SECOND MISSION OF THE SMALL CLASS EXPLORER (SMEX) PROGRAM. IT IS DESIGNED TO BE A 1-YR. MISSION WITH LAUNCH CURRENTLY PLANNED FOR SEPTEMBER, 1994. FURTHERMORE, THE ASSUMED ORBITAL ELEMENTS FOR CURRENT STUDIES ARE LISTED BELOW:

EPOCH: MIDPOINT OF	JAN. 15, 1994 0HR. 0 MIN. 0 SEC.
NORTHERN CAMPAIGN	GREENWICH MEAN TIME (GMT)
SEMIMAJOR AXIS:	8653.166 KM
ECCENTRICITY:	0.222462 DEG
INCLINATION:	83.00000 DEG
RA OF ASCENDING NODE:	84.21000 DEG
ARGUMENT OF PERIGEE:	288.5400 DEG
MEAN ANOMALY:	0.000000 DEG

(THESE ELEMENTS REFLECT A 350km x 4200km ORBIT WHERE APOGEE AND PERIGEE PRECESS THROUGH TWO REVOLUTIONS PER YEAR). FAST WAS DEVELOPED FOR THE INVESTIGATION OF THE PLASMA PHYSICS OF AURORAL PHENOMENA AT EXTREMELY HIGH TIME AND SPATIAL RESOLUTIONS, UTILIZING FAST DATA SAMPLING AND TO INVESTIGATE THE PLASMA PHYSICS AT LOW ALTITUDE AURORAL ZONE. THE PROJECT SCIENTISTS HAVE A WAY OF DETERMINING WHEN THE FAST SPACECRAFT ENTERS AND EXITS THE AURORA ZONE. THESE SCIENTISTS WILL BE LOCATED AT POKER FLATS (ALASKA) FOR THE NORTHERN CAMPAIGN. THE NORTHERN CAMPAIGN IS DEFINED TO BE THE 60 DAYS PERIOD CENTERED AROUND JANUARY 15, 1995. DURING THE NORTHERN CAMPAIGN, APOGEE WILL BE OVER THE NORTH POLE. THE MISSION OPERATION MANAGER (MOM) AND FLIGHT OPERATION TEAM (FOT) STATIONED AT GODDARD WOULD LIKE TO HAVE THEIR OWN

ESTIMATE OF THE SPACECRAFT ENTRY AND EXIT TIMES THROUGH THE AURORA ZONE. THE FLIGHT DYNAMICS FACILITY HAS BEEN REQUESTED TO PROVIDE THE MOM AND FOT WITH THIS INFORMATION.

TO MEET FAST'S NEEDS THE PROJECT IS CONSIDERING THE FOLLOWING TRACKING STATIONS LOCATIONS TO SUPPORT FAST: POKER FLATS (ALASKA), SANTIAGO (CHILE), CANBERRA (AUSTRALIA), WALLOPS ISLAND (VIRGINIA), AND GOLDSTONE (CALIFORNIA). THE TRANSPORTABLE TRACKING EQUIPMENT IS AN ANTENNA DISH AND OTHER EQUIPMENT THAT CAN BE TRANSPORTED FROM ONE PLACE TO ANOTHER WILL BE POSITIONED AT POKER FLATS. TRACKING DATA CONSISTS OF MEASUREMENTS SUCH AS DOPPLER, ANGLES OR RANGE WHICH WE USED IN THE ORBIT DETERMINATION (OD) SYSTEM TO PROVIDE POSITION AND VELOCITY OF THE SPACECRAFT AT A GIVEN TIME OR AN EPHEMERIS FOR A SPECIFIED PERIOD OF TIME. THESE GROUND STATIONS SEND COMMANDS UP TO FAST. THEY PROCESS THE RETURN SIGNAL TO PROVIDE TRACKING AND TELEMETRY DATA.

III. STATEMENT OF PROBLEM (MY SUMMER PROJECT)

DETERMINE WHEN THE FAST SPACECRAFT ENTERS AND EXITS THE AURORA ZONE. THE MOM AND FOT WANT TO KNOW THE ENTRY AND EXIT TIMES OF THE SPACECRAFT IN THE AURORA. ONE APPROACH CONSIDERED WAS TO SELECT A GEOGRAPHICAL REGION, FORM A GEOMETRICAL SHAPE WHERE THE AURORA MAY OCCUR, AND THEN OVERLAY THE RESULTS ON A MAP TO SEE THE LATITUDE AND LONGITUDE OF THE ENTRY AND EXIT TIMES OF THE AURORA ZONE. THE APPROACH THAT I TOOK, WITH THE HELP OF CHARLIE PETRUZZO (CODE 745), WAS TO CONSIDER THE RELATIVE POSITIONS OF THE SUN AND THE MAGNETIC NORTH POLE. THESE TWO ELEMENTS HAVE GREAT EFFECTS ON THE AURORA. THE MAGNETIC NORTH POLE LOCATION IS 289.3 DEGREES LONGITUDE AND 78.6 DEGREES LATITUDE.

IV. METHODOLOGY

COMPUTATIONS WERE MADE TO DETERMINE THE FAST SPACECRAFT ENTRY AND EXIT TIMES AT THE AURORA ZONE AND THEIR CORRESPONDING SUBSATELLITE PROJECTIONS ON THE EARTH. FIRST, THE AURORA CONE'S VERTEX IS POSITIONED AT THE CENTER OF EARTH. THE AURORA CONE HAS A HALF ANGLE THAT IS EQUAL TO 23 DEGREES. THE REASON FOR USING A 23 DEGREES HALF ANGLE IS BECAUSE THE HIGH ALTITUDE USED FOR THE SPACECRAFT IS AT APOGEE (4200KM). MOREOVER, THE AURORA CONE IS ALTITUDE DEPENDENT. TO FIND THE POSITION OF THE CONE'S AXIS, CONSIDER THE SUN POSITION AND THE GEOGRAPHICAL NORTH POLE (GNP) POSITION. THE GEOGRAPHICAL NORTH POLE RIGHT ASCENSION IS 0 DEGREE AND THE DECLINATION IS 90 DEGREES. THIS IS CONVERTED TO A UNIT VECTOR. A CROSS PRODUCT IS USED WITH THE SUN POSITION AND THE GEOGRAPHICAL NORTH POLE. THE FOLLOWING EQUATION IS :

$$\vec{U_Y} \times \vec{U_Z} = \vec{U_X} \quad (\text{EQ. 1-1})$$

WHERE U_Y IS THE UNIT VECTOR FOR THE SUN'S RIGHT ASCENSION ON THE EQUATORIAL PLANE, U_Z IS THE UNIT VECTOR FOR THE GEOGRAPHICAL NORTH POLE POSITION, AND U_X IS THE NEW UNIT VECTOR WHICH COMPLETED THE DEFINITION OF THE RIGHT HAND COORDINATE SYSTEM. THE MAGNETIC NORTH POLE (MNP) IS ROTATED 4 DEGREES AWAY FROM THE SUN ABOUT THE NEW UNIT VECTOR. THE RESULTING UNIT VECTOR OF ROTATING

THE MAGNETIC NORTH POLE AWAY FROM THE SUN, IS THE AURORA AXIS. THESE COMPUTATIONS WERE USED TO CONSTRUCT FIGURE 1 WHICH SHOWS THE RIGHT HAND COORDINATE SYSTEM AND THE 4 DEGREES ROTATION. THE REASON FOR THE 4 DEGREES ROTATION IS BECAUSE THE SCIENTISTS STATE THAT THE AURORA CONE IS AFFECTED BY THE SOLAR WINDS, WHICH ARE PARTICLES CONSISTING MAINLY OF PROTONS AND ELECTRONS THAT FLOW OUT FROM THE SUN WITH A SUPERSONIC SPEED, PUSHING THE MAGNETIC FIELD. THE MAGNETIC NORTH POLE POSITION DOESN'T CHANGE IN THIS CASE, BUT IT IS USED TO DETERMINE WHERE THE AURORA AXIS IS LOCATED. THE ROTATION IS AS FOLLOWS:

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos(\phi) & \cos(\phi) \\ 0 & -\sin(\phi) & \cos(\phi) \end{bmatrix} \begin{bmatrix} U_M \\ U_M \\ U_M \end{bmatrix} = \begin{bmatrix} U_A \\ U_A \\ U_A \end{bmatrix} \quad (\text{EQ. 1-2})$$

WHERE ϕ IS THE ROTATION ANGLE, U_M IS THE UNIT VECTOR OF THE MAGNETIC NORTH POLE, AND U_A IS THE RESULTANT UNIT VECTOR FOR THE AURORA AXIS.

NOTE: IF THERE IS NO ROTATION OF 4 DEGREES, THEN THE AURORA AXIS IS AT THE RIGHT ASCENSION AND DECLINATION OF THE MAGNETIC NORTH POLE.

NEXT, COMPUTE THE SEPARATION ANGLE BETWEEN THE AURORA AXIS AND THE SPACECRAFT POSITION. HENCE, CHECK THE POSITION OF THE SPACECRAFT AT A GIVEN TIME. TO DETERMINE IF THE SPACECRAFT IS IN/OUT OF THE AURORA CONE, GET THE DOT PRODUCT OF THE AURORA AXIS AND THE SPACECRAFT POSITION. THE DOT PRODUCT IS USED BECAUSE WE WILL BE ABLE TO DETERMINE THE SEPARATION ANGLE. THE SEPARATION ANGLE IS OBTAINED BY TRANSFORMING THE DOT PRODUCT EQUATION:

$$U_A \cdot S/C = \begin{cases} |U_A| |S/C| \cos(\theta), & \text{IF } U_A \neq 0 \text{ AND } S/C \neq 0 \\ 0, & \text{IF } U_A = 0 \text{ OR } S/C = 0 \end{cases}$$

TO

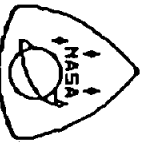
$$(\theta) = \cos^{-1} ((U_A \cdot S/C) / (|U_A| |S/C|)) \quad (\text{EQ. 1-3})$$

WHERE U_A IS THE AURORA AXIS, S/C IS THE SPACECRAFT POSITION, AND θ IS THE ANGLE BETWEEN U_A AND S/C . FURTHERMORE, IF THE SEPARATION ANGLE BETWEEN THE AURORA AXIS AND THE SPACECRAFT POSITION IS GREATER THAN 23 DEGREES, THEN THE SPACECRAFT IS OUT OF THE CONE. HOWEVER, IF THE SEPARATION ANGLE IS LESS THAN OR EQUAL TO 23 DEGREES, THEN THE SPACECRAFT IS IN THE CONE. PERFORM THIS PROCESS AT 1 MINUTE INTERVALS (CHECKING POSITIONS OF SPACECRAFT AND SUN):

$$t(n) + 1' = T \quad (\text{EQ. 1-4})$$

WHERE $t(n)$ IS EQUAL TO THE EPOCH, AND T IS THE RESULTANT TIME. THIS PROCESS CONTINUES UNTIL WE FIND A GOOD APPROXIMATION. THE TIME AND THE POSITION OF THE SPACECRAFT IS TAKEN FROM THE EPHEMERIS FILE WHERE AS THE SUN POSITION IS TAKEN FROM THE SOLAR LUNAR PLANETARY FILE (SLP). THESE POSITIONS MUST BE TAKEN AT CORRE-

SPONDING TIMES. ONCE THESE FILES ARE COMPLETED, THE PROCESS MAY END. IT MAY TAKE THE SPACECRAFT APPROXIMATELY 18 TO 26 MINUTES TO GO COMPLETELY THROUGH THE AURORA CONE. THE SAME PROCEDURE IS USED IF WE ARE EXITING THE AURORA CONE. FIGURE 2 OF THE CELESTIAL SPHERE SHOWS THE PROCEDURE THAT WAS USED FOR THE SPACECRAFT ENTRY AND EXIT TIMES OF THE CONE (VIEWER SEES THE RIM OF THE CONE FROM THE TOP POSITION). FINALLY, THERE IS AN EXAMPLE THAT GIVES A DESCRIPTION OF HOW THE PROCESS IS USED WITH REAL DATA.



X-AXIS

AURORA CONE

Y-AXIS

Z-AXIS
(GNP)

AURORA
AXIS

23°

S/C



GSF
C

FIGURE 1

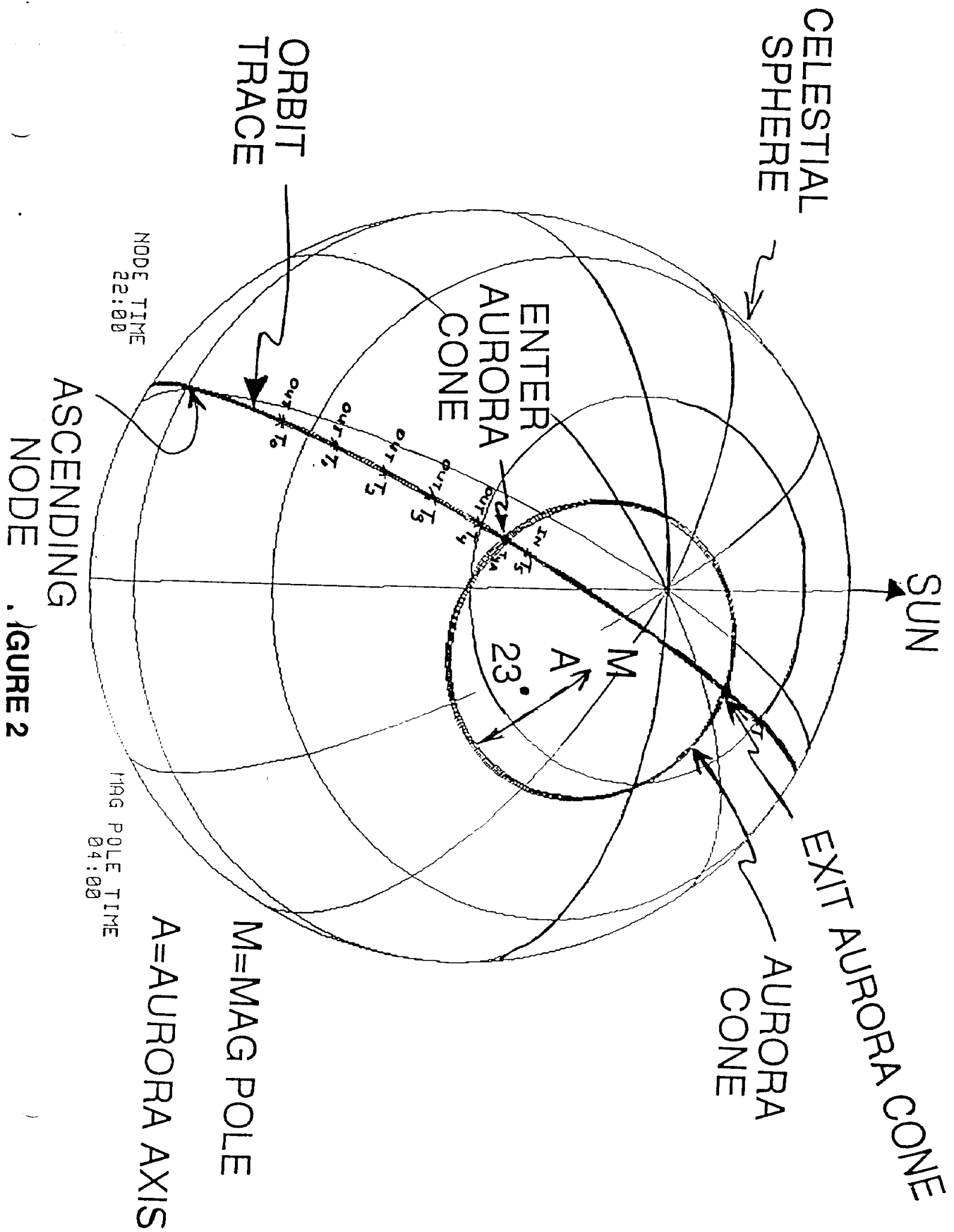


FIGURE 2

V. EXAMPLE:

GIVEN: UA CONE = 23 DEGREES HALF-ANGLE

UA POS. = ROTATE MNP 4 DEGREES AWAY FROM THE SUN

EPOCH: JAN. 15, 1994 0HR. 0 MIN. 0 SEC. GREENWICH MEAN TIME (GMT)

	<u>RIGHT ASCENSIONS</u>	<u>DECLINATIONS</u>
MNP POS. =	289.3 DEG	78.6 DEG
SUN POS. =	296.5 DEG	-21.2 DEG
GNP POS. =	0.0 DEG	90.0 DEG
S/C POS. =	-49.97 DEG	-70.34 DEG

BY EQUATION 1-1, WE CAN APPLY THE CROSS PRODUCT OF THE TWO VECTORS:

$$0.4162961, -0.834205, -0.361662) \times (0.00000, 0.00000, 1) = \vec{UX}$$

WHERE $\vec{UX} = (-0.834205, -0.4162961, 0.000000)$ IS THE NEW UNIT VECTOR. THE MAGNETIC NORTH POLE UNIT VECTOR IS

$$\vec{UM} = (0.06532854, -0.1865492, 0.9802712).$$

THIS UNIT VECTOR UM IS ROTATED 4 DEGREES ABOUT THE NEW UNIT VECTOR UX. THE RESULTANT UNIT VECTOR IS

$$\vec{UA} = (-0.5372502, -0.6299052, -0.447607)$$

WHERE UA IS THE AURORA AXIS. FROM THIS RESULT, ONE CAN CONSTRUCT THE AURORA CONE WITH THE 23 DEGREES HALF ANGLE.

SINCE WE KNOW THE POSITIONS OF THE CONE AND THE SPACECRAFT, WE CAN FIND THE ANGLE BETWEEN THEM BY USING DOT PRODUCT FROM EQUATION 1-3. HERE IS THE FOLLOWING

$$\vec{UA} = (-0.5372502, -0.6299052, -0.4476070)$$

AND

$$\vec{S/C} = (0.21637380, -0.2575849, -0.9417178)$$

WHERE UA AND S/C ARE DEFINED ON PAGE 3. THE SEPARATION ANGLE BETWEEN THE TWO DATA IS 60.21419 DEGREES. SINCE THE ANGLE IS GREATER THAN 23 DEGREES, WE ARE OUT OF THE CONE. THIS PROCESS CONTINUES UNTIL THE SEPARATION ANGLE IS LESS THAN OR EQUAL TO 23 DEGREES.

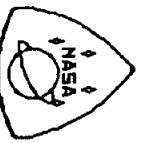
VI. SUMMARY

FROM THE INFORMATION GIVEN, IT IS CLEAR THAT THIS METHOD IS FEASIBLE. THIS METHOD CAN GET A BETTER ESTIMATE WITH THE TIME OF THE SPACECRAFT ARRIVAL AND DEPARTURE OF THE CONE. THE AURORA CONE WAS DEFINED, AND THE IDENTIFIED ALGORITHMS FOR DETERMINING THE SPACECRAFT ENTRY AND EXIT TIMES OF THE AURORA CONE ARE KNOWN. FLIGHT DYNAMICS DIVISION (FDD) CAN NOW COMPLETE THE REQUIREMENTS AND SPECIFICATIONS FOR SOFTWARE. AS A RESULT, THESE ALGORITHMS CAN BE IMPLEMENTED IN SUPPORT OF THE FLIGHT DYNAMICS DIVISION TO DETERMINE THE SPACECRAFT ENTRY AND EXIT OF THE AURORA ZONE.

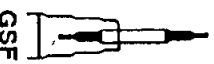
FAST AURORA ZONE
ANALYSIS

CODE 554.2 BLDG 23
BY MATTIE BOOKER

AUGUST 6, 1991



FLIGHT DYNAMICS
DIVISION



AGENDA

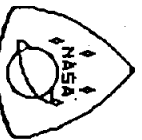
INTRODUCTION

BACKGROUND INFORMATION

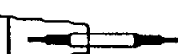
STATEMENT OF PROBLEM

METHODOLOGY

SUMMARY



FLIGHT DYNAMICS
DIVISION



GSF

BACKGROUND

FAST AUROPORAL SNAPSHOT TELESCOPE

LAUNCH DATE: SEPT., 1994

NORTHERN CAMPAIGN: JAN. 15, 1995
(+/-30 days)

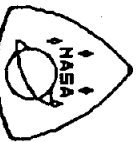
INCLINATION: 83 DEGS.

PERIGEE: 350 KM

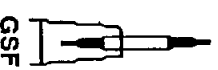
APOGEE: 4200 KM

PERIOD OF ORBIT: 2 HRS. 13 MINS.; 133MINS.

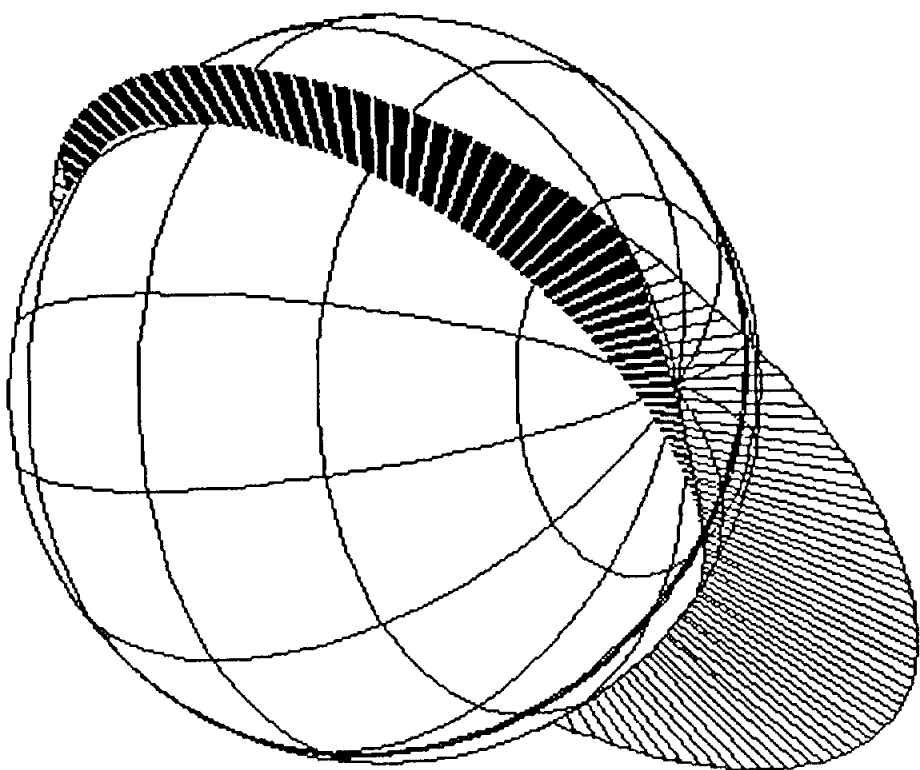
MISSION LIFE: 1 YEAR



FLIGHT DYNAMICS
DIVISION



ALT = 4200/350
INCL = 83
RAAN = 87
22.00 HR
ARGP = 290
STEP = 60



Y/M/D = 94/01/15
SUN RA = 287
DEC = -21
BETA = 25

DRAWN
5-AUG-91
12:24
GSFC 745

VIEW FROM
RA - 132
1.00 HR
DEC - 40

STATEMENT OF PROBLEM

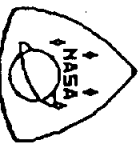
(RESEARCH & DEVELOPMENT)

INVESTIGATE A CONCEPTUAL APPROACH
TO MEET THE PROJECT REQUIREMENT:

TO DETERMINE THE SPACECRAFT ENTRY
& EXIT TIMES OF THE AURORA ZONE

PURPOSE

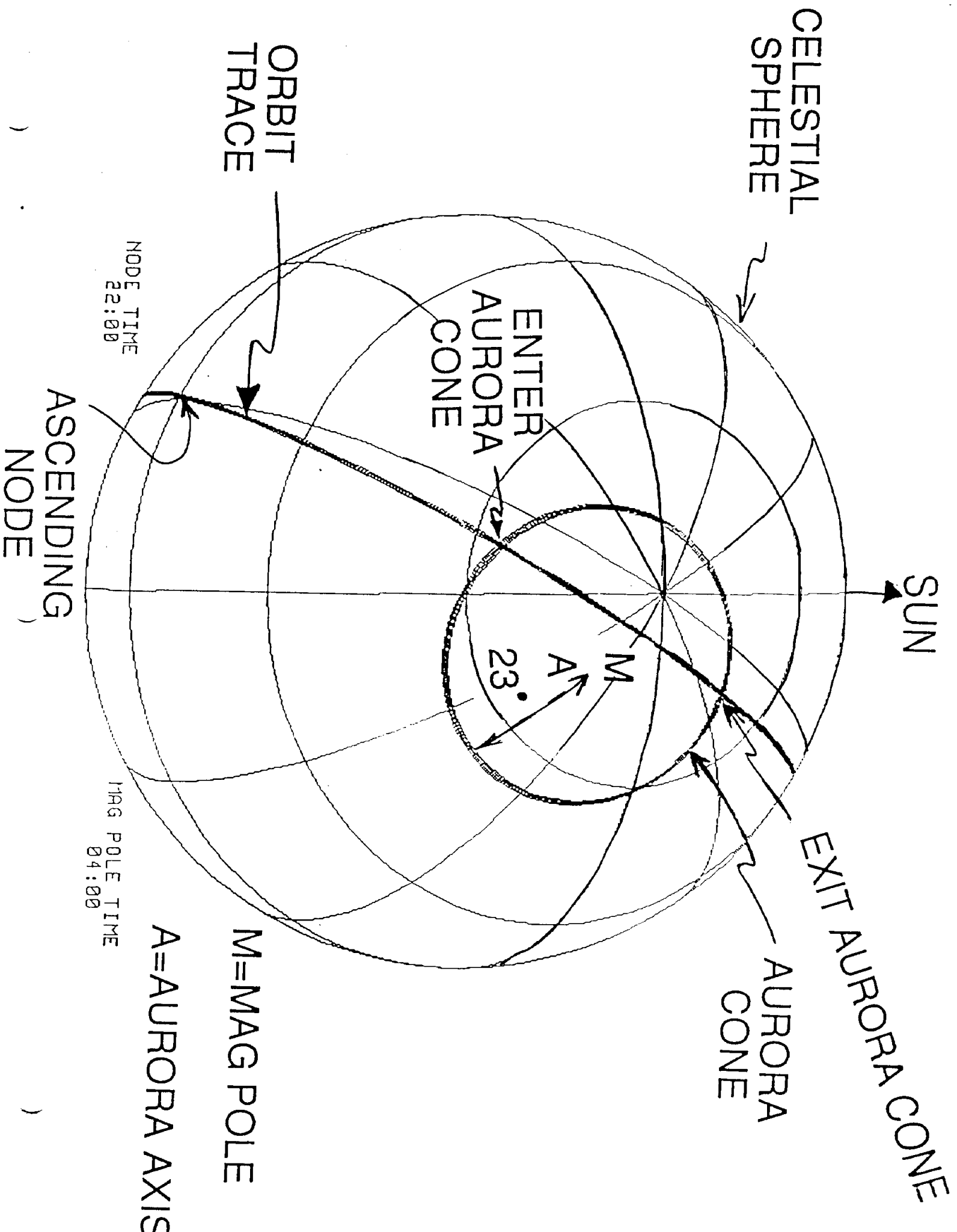
TO PROVIDE FOT LOCATED AT GODDARD
WITH AN ESTIMATE OF ENTRY & EXIT TIMES



FLIGHT DYNAMICS
DIVISION



GSF

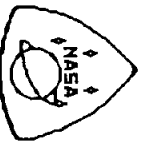


METHODOLOGY

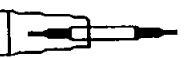
TO FIND AURORA CONE AXIS:

→
RA OF SUN X GEO. N. POLE = ROTATION AXIS →

→
[ROTATION MATRIX] [MAG. N. POLE] = [AURORA AXIS] →



FLIGHT DYNAMICS
DIVISION



GSF
C

METHODOLOGY (CON'T)

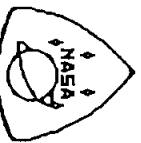
TO FIND SEPARATION ANGLE, θ ,
BETWEEN CONE AND SPACECRAFT:

$$I \bullet J = \cos \theta$$

WHERE I & J ARE UNIT VECTORS FOR AURORA AXIS
AND S/C REFERENCED TO CENTER OF THE EARTH

SEPARATION ANGLE $< = 23$ DEG.; IN

SEPARATION ANGLE > 23 DEG.; OUT



FLIGHT DYNAMICS
DIVISION



GSF

Z-AXIS
(GNP)

AURORA
AXIS

S/C

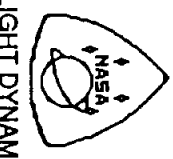
23°

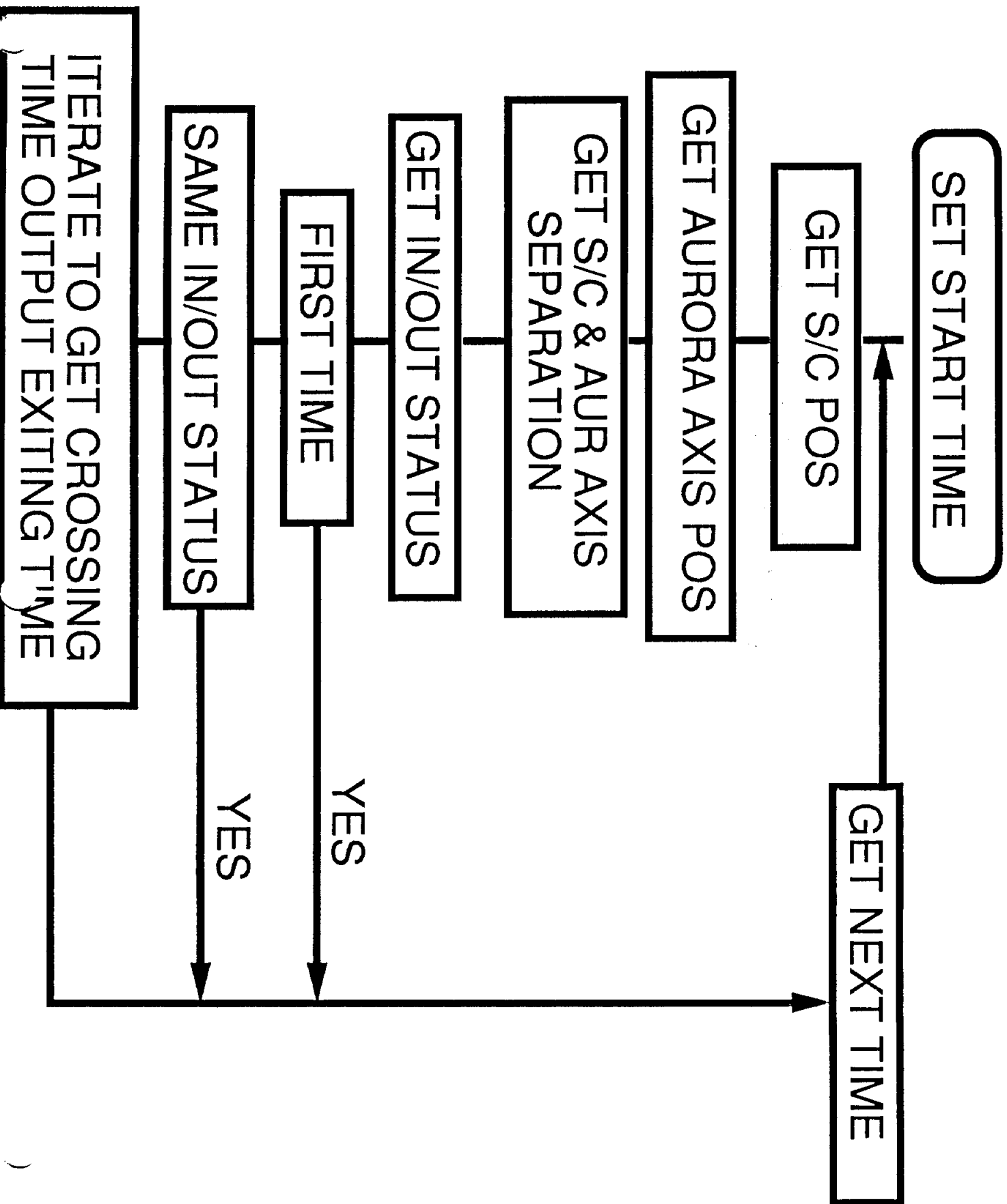
X-AXIS

Y-AXIS

AURORA CONE

FLIGHT DYNAMICS
DIVISION





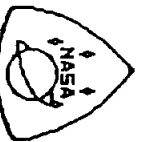
SUMMARY

CONE WAS DEFINED

IDENTIFIED METHODS FOR DETERMINING
ENTRY & EXIT TIMES

FDD CAN NOW COMPLETE REQUIREMENTS
& SPECIFICATIONS FOR SOFTWARE

ALGORITHM MAY BE IMPLEMENTED IN
SUPPORT OF THE FDD FAST REQUIREMENT



FLIGHT DYNAMICS
DIVISION



ABSTRACT

3-36
3-32
N 9 2 - 2 3 9 6 4 1 9

INJECTION SEEDING OF A Q-SWITCHED ALEXANDRITE LASER:
STUDY OF FREQUENCY STABILIZATION

INTERN: LAMARR A. BROWN

MENTOR: GEARY SCHWEMMER

COORDINATOR: Dr. CLINTON LEE

4260 8524

AlGaAs diode lasers were used to injection seed a pulsed Q-switched alexandrite laser which produced a narrowband of radiation. Injection seeding is a method for achieving linewidths of less than 500 MHz in the output of broadband, tunable solid state lasers. Also, injection seeding made the frequency of the pulsed, Q-switched alexandrite laser stabilize. The AlGaAs diode lasers are available in wavelengths from 760 to 770 nm in the oxygen A band, which was used for the lidar remote sensing of atmospheric pressure and temperature. When the diode laser was set at a current of 59.8 mA and a temperature of 14.04 C, the wavelength was 767.6 nm. The average full width at half the maximum (AVG. FWHM) was 0.007 ± 0.001 cm^{-1} and the change in wavenumber was 0.045 cm^{-1} . When seeding the pulsed Q-switched alexandrite laser, the AVG. FWHM was $0.035 \pm 0.009 \text{ cm}^{-1}$ and the change in wavenumber was 0.021 cm^{-1} . The Q-switched alexandrite laser was injection seeded and frequency stabilization was studied. The linewidth requirement was met, but the stability requirement due to drifting in the feedback voltage to the laser diode was not. Improvements to the injection seeding of a Q-switched alexandrite laser should focus on increasing the feedback voltage to the laser diode, filtering the laser diode by using temperature controlled narrowband filters, and the use of diamond (SiC) grating placed inside the alexandrite laser's resonator cavity.

INJECTION SEEDING OF A Q-SWITCHED ALEXANDRITE LASER:
STUDY OF FREQUENCY STABILIZATION

BY

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AUG. 7, 1991

OUTLINE

— *LIDAR (LIGHT DETECTION AND RANGING)*

- *USED IN THE STUDIED OF ATMOSPHERIC PRESSURE AND TEMPERATURE*

- *Q-SWITCHED ALEXANDRITE LASER*

- *INJECTION SEEDING*

— *WAVEMETER*

- *USED IN DETERMINING FREQUENCY STABILIZATION*

— *MEASUREMENT OF He-Ne (CALIBRATION), DIODE LASER, AND SEEDED Q-SWITCHED ALEXANDRITE LASER*

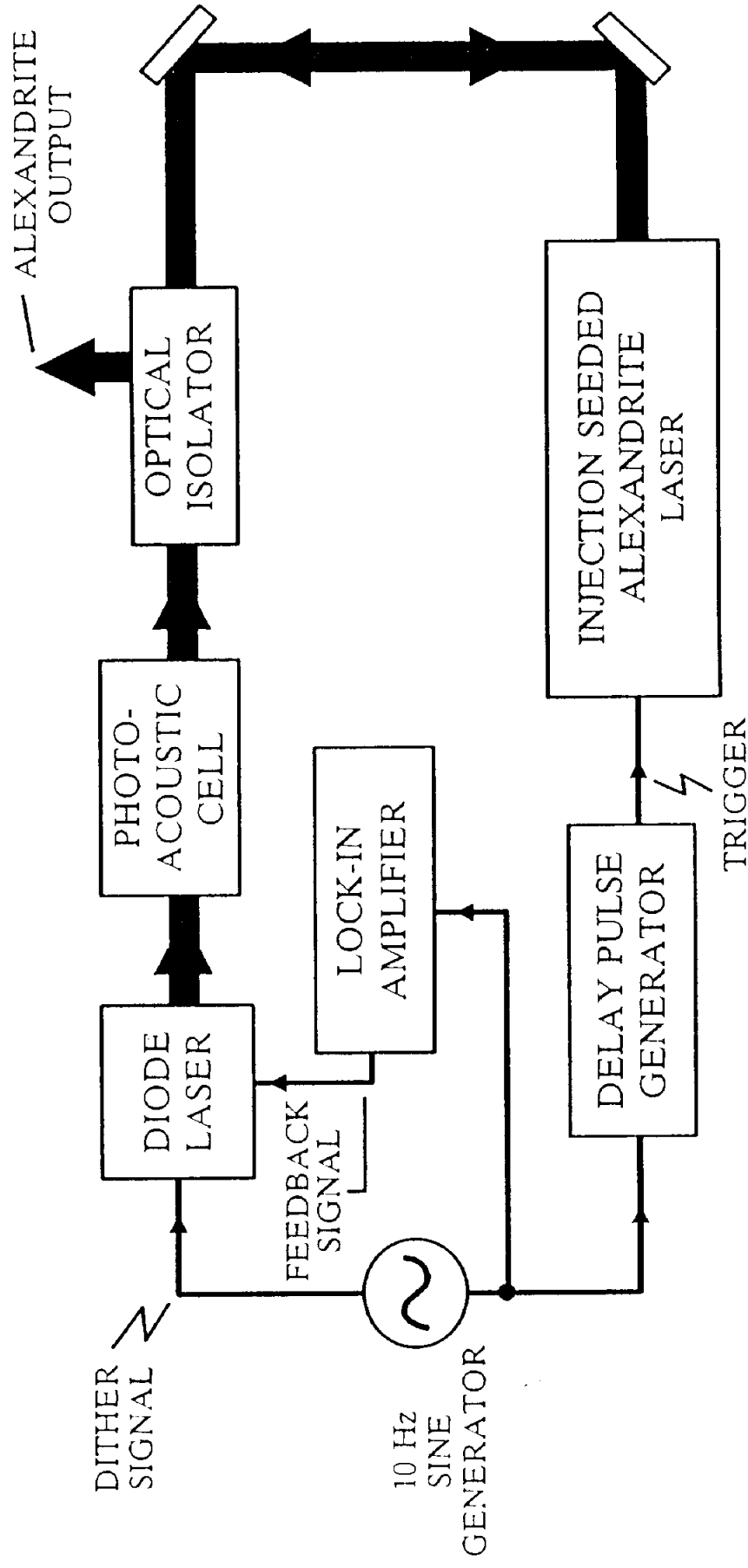
CONCEPT

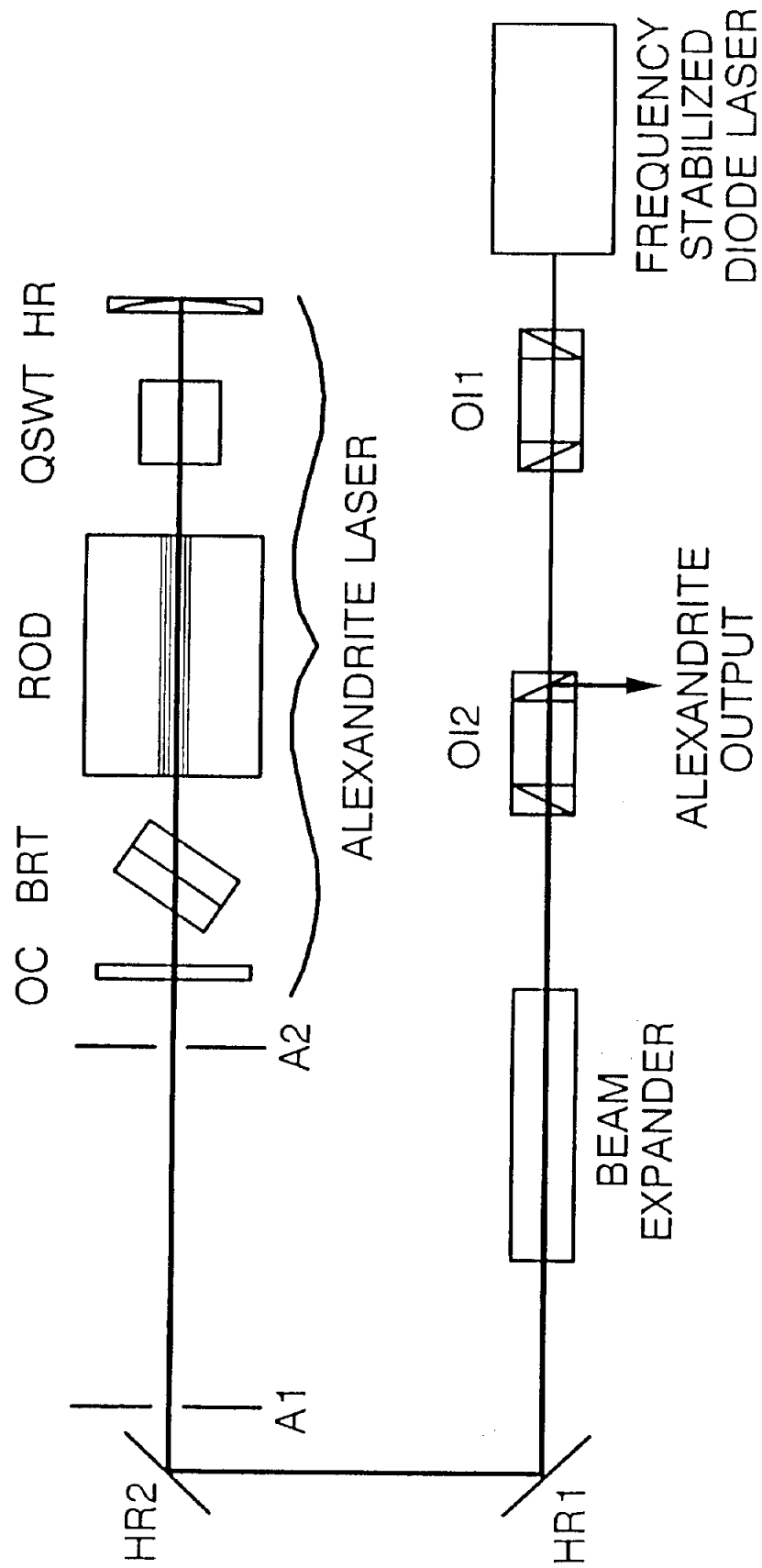
DIODE LASERS - LOW POWER, SINGLE MODE, CW
FREQUENCY STABILIZED - LOCKED TO ATMOSPHERIC
ABSORPTION LINES

PURPOSE/ADVANTAGES:

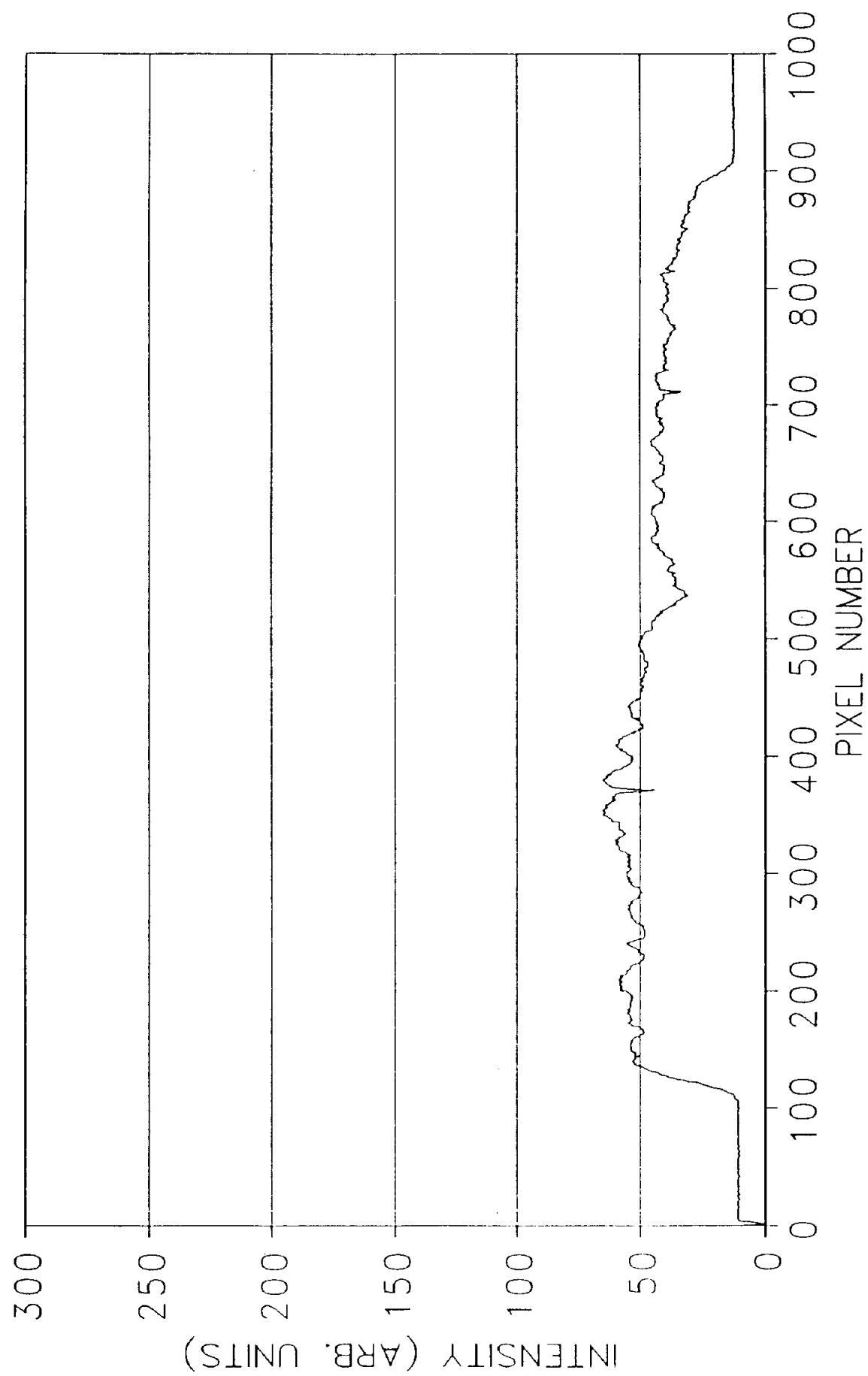
- INJECTION SEED PULSED LASERS
- FREQUENCY STABILIZE INTERFERENCE
FILTERS
- ABSOLUTE FREQUENCY REFERENCE

PULSED LASER FREQUENCY STABILIZATION



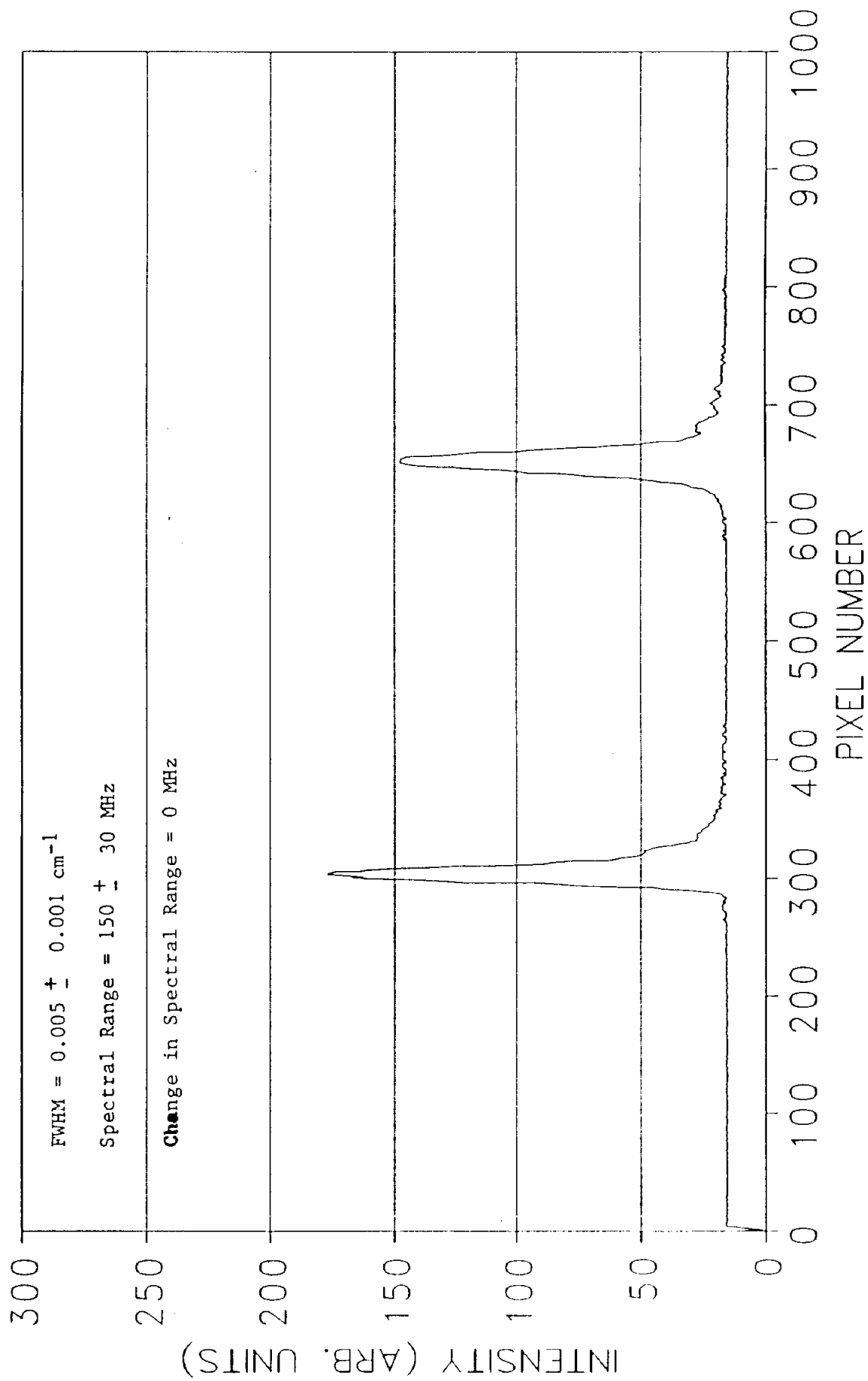


ALEX.710
AVG. DATA



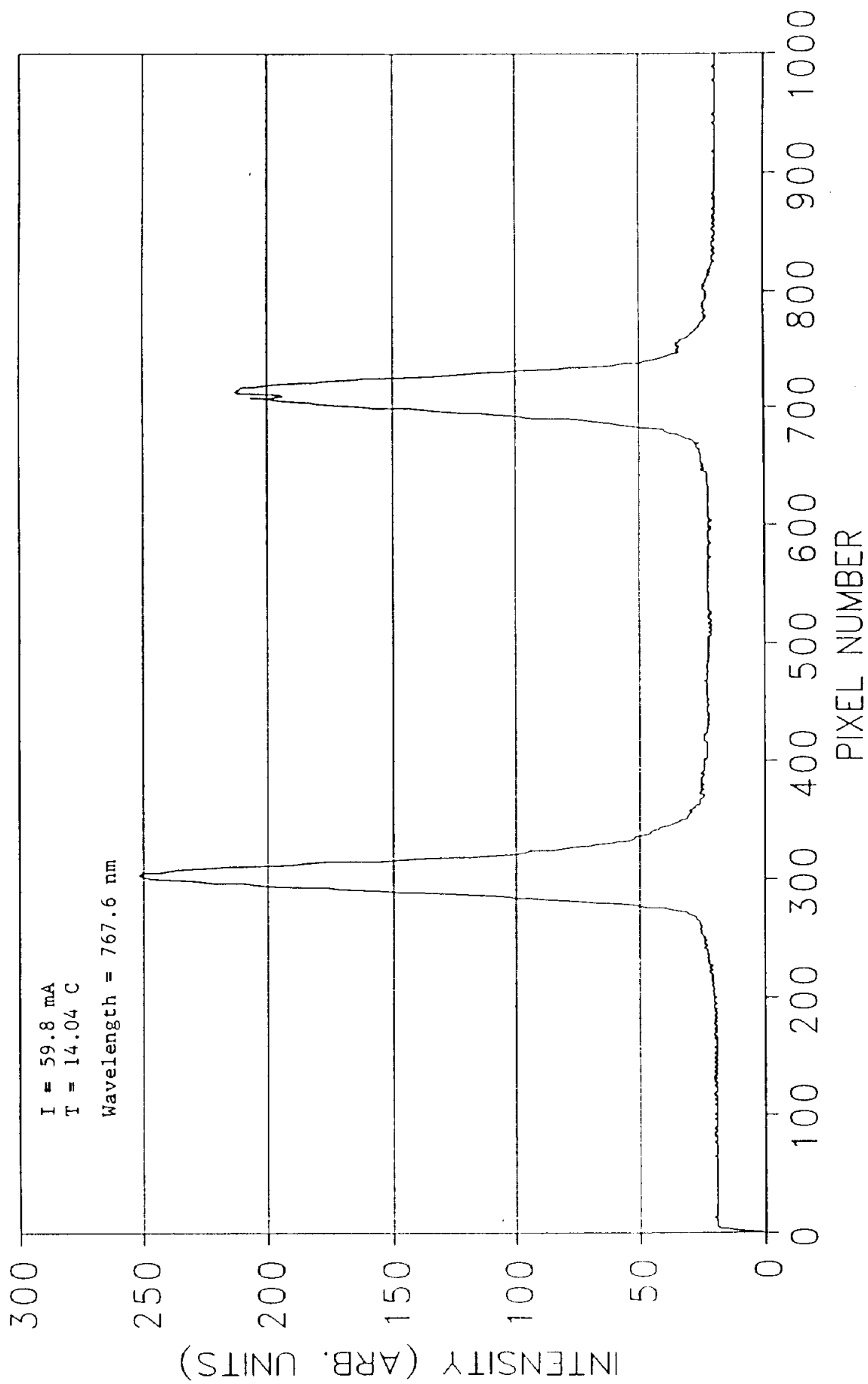
HENE627

AVG. DATA



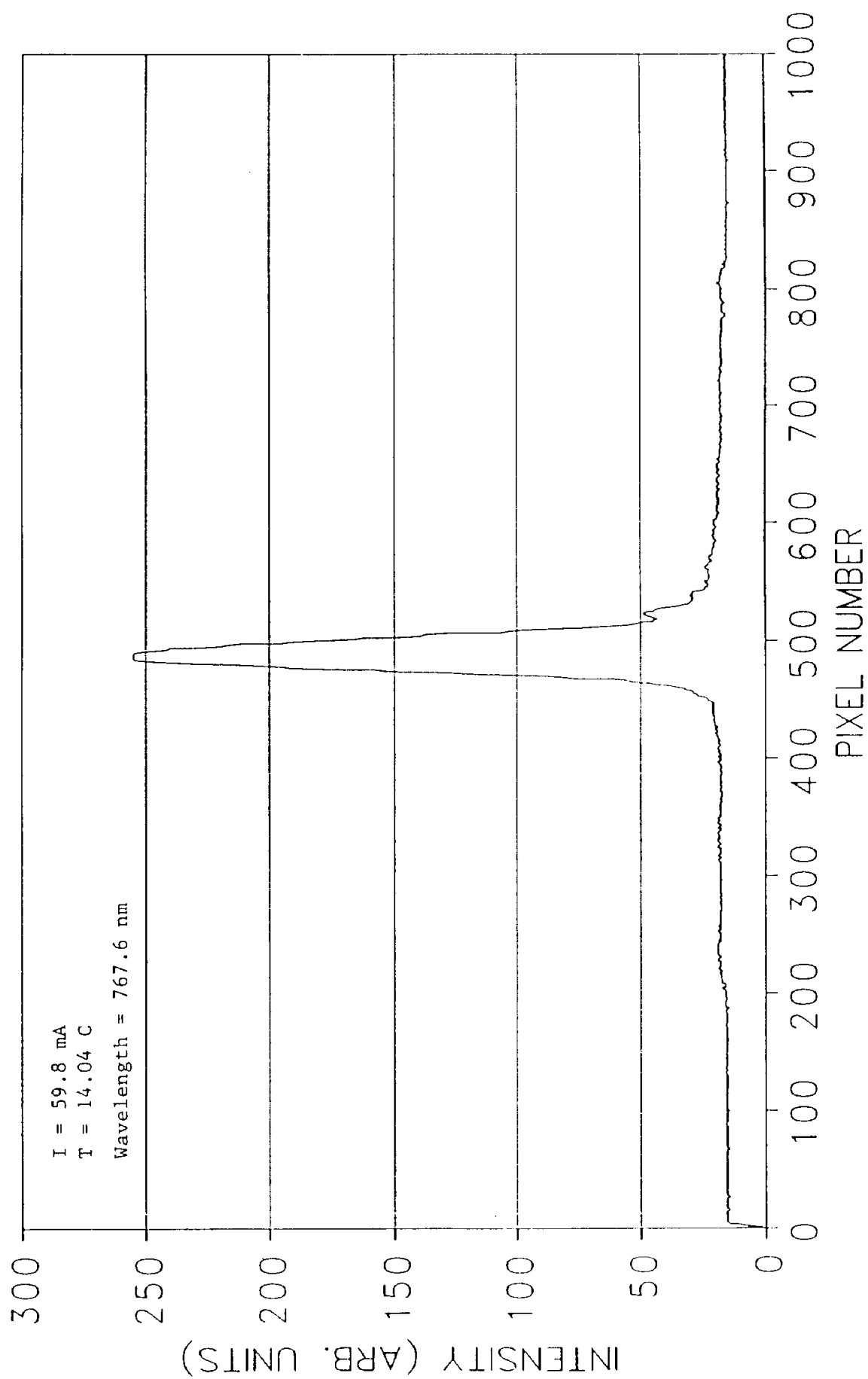
DIOD628.1

AVG. DATA



DIOD628.2

AVG. DATA

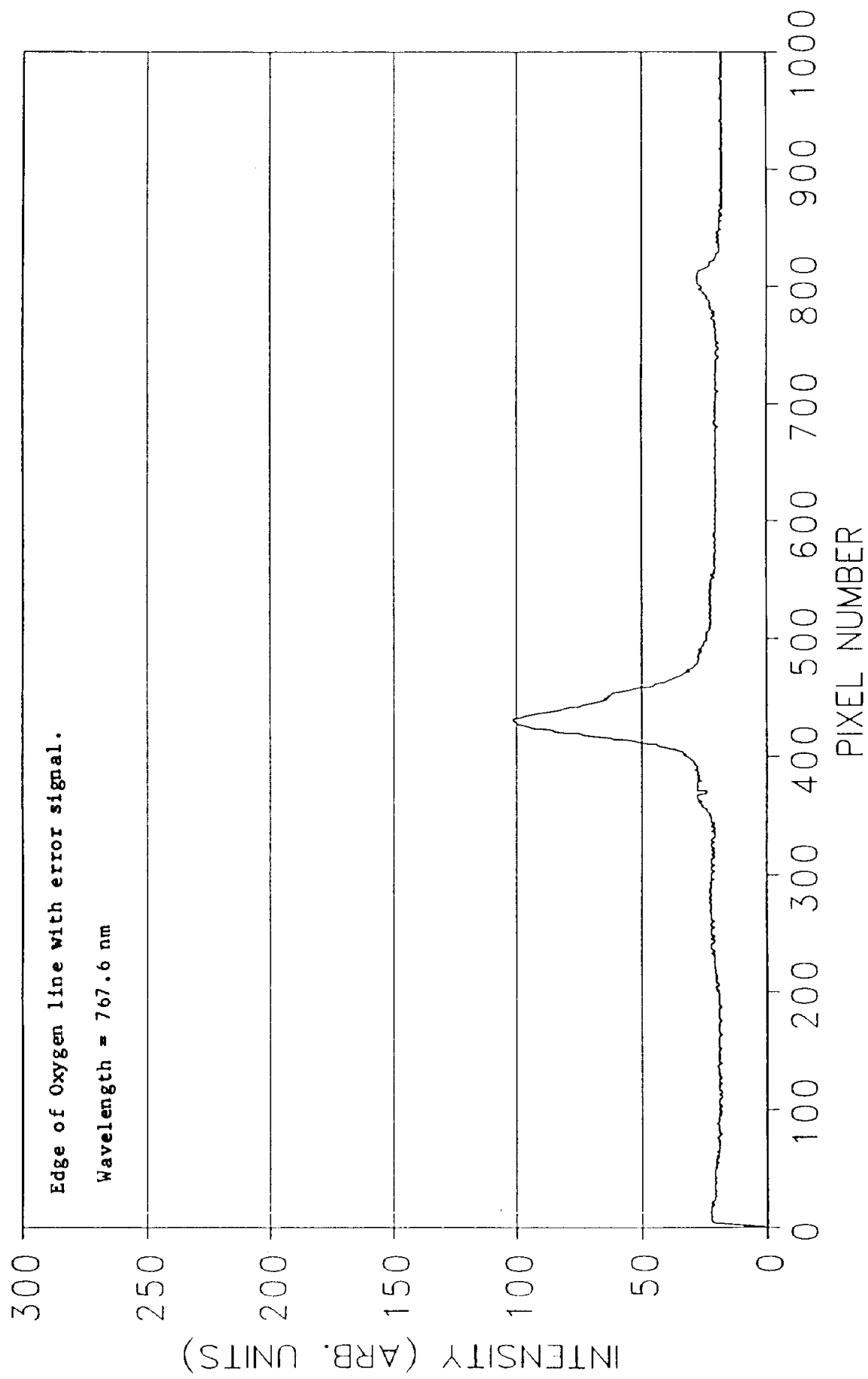


LASER DIODE	AVG. FWHM (cm ^{** -1})	SPECTRAL RANGE (MHz)	CHANGE IN WAVENUMBER (cm ^{** -1})	CHANGE IN SPECTRAL RANGE (MHz)
DIOD627.X I = 60.0 mA T = 14.05 C WAVE- LENGTH = 766.0 nm	0.009 ± 0.001	270 ± 30	0.010	300
DIOD628.X I = 59.8 mA T = 14.04 C WAVE- LENGTH = 767.6 nm	0.007 ± 0.001	210 ± 30	0.045	1350
*DIOD709.X T = 10.89 C WAVE- LENGTH = 759.5 nm	0.008 ± 0.001	240 ± 30	0.003	90
**DIOD710.X I = 60.5 mA T = 10.83 C WAVE- LENGTH = 759.6 nm	0.008 ± 0.001	240 ± 30	0.027	810
**DIOD716.X WAVE- LENGTH = 760.4 nm	0.007 ± 0.001	210 ± 30	0.005	150

* For DIOD709.X I = 60.7 mA ; *New Laser Diode; **Same current and Temperature.

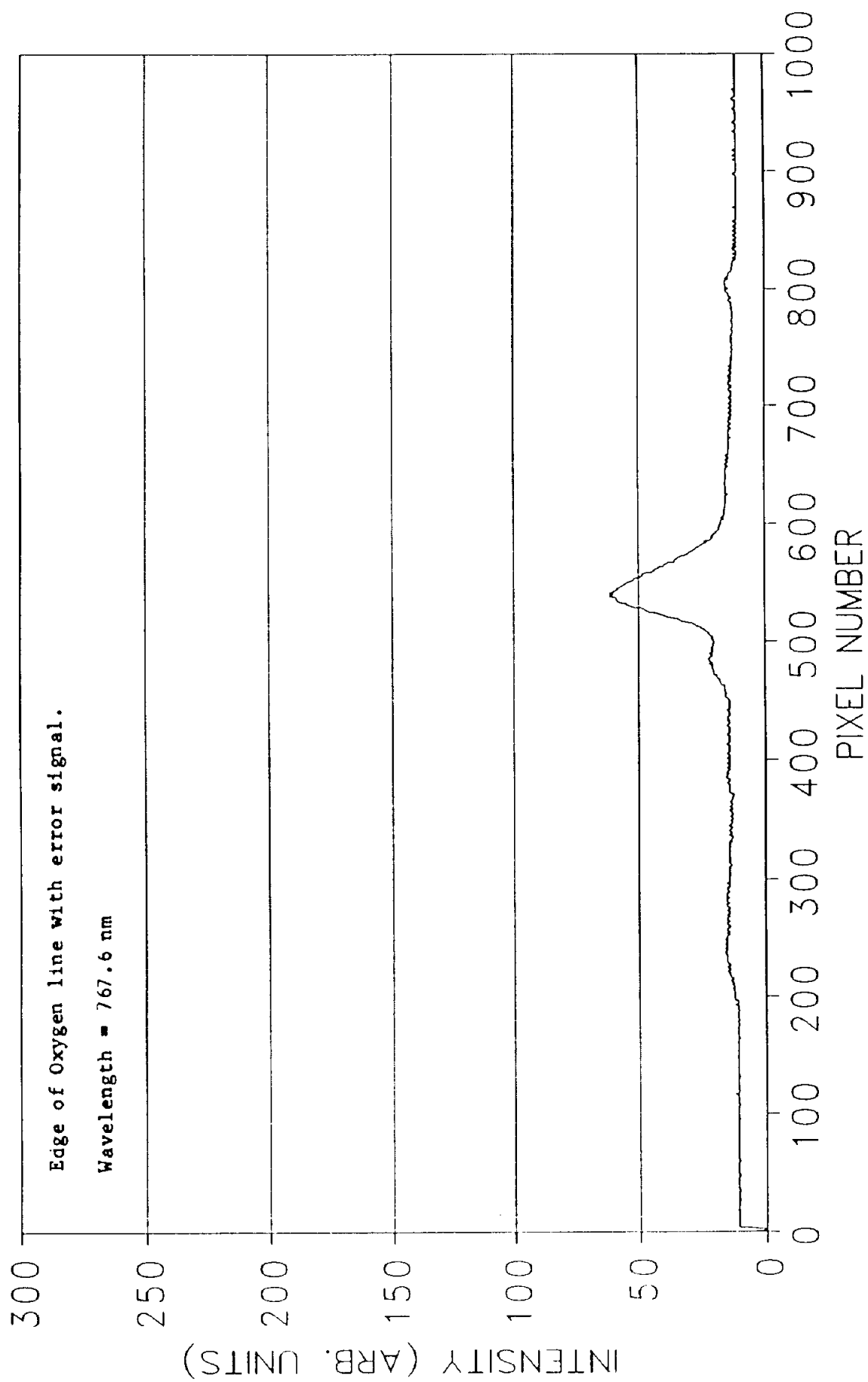
SEED628.1

AVG. DATA



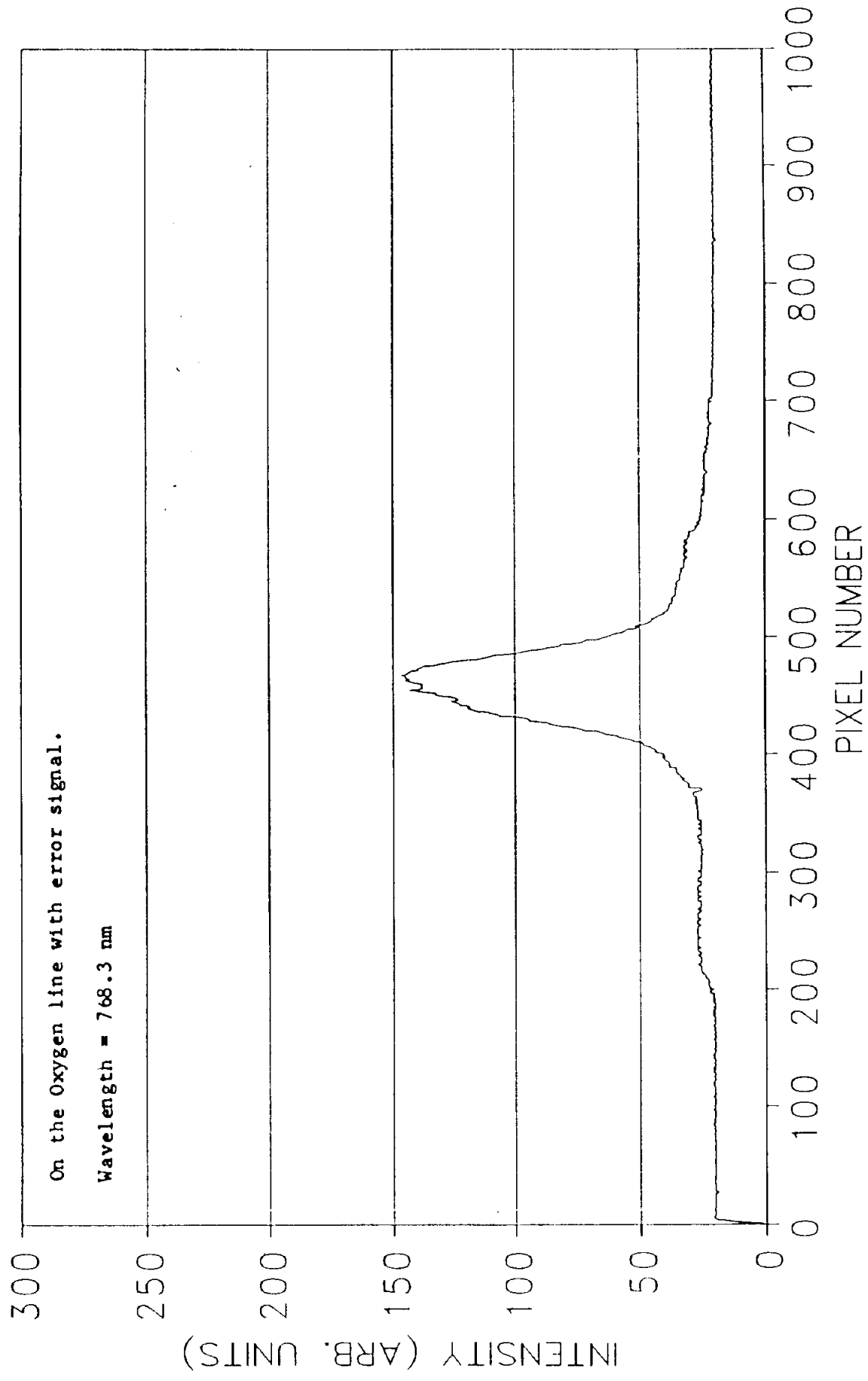
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AVG. DATA



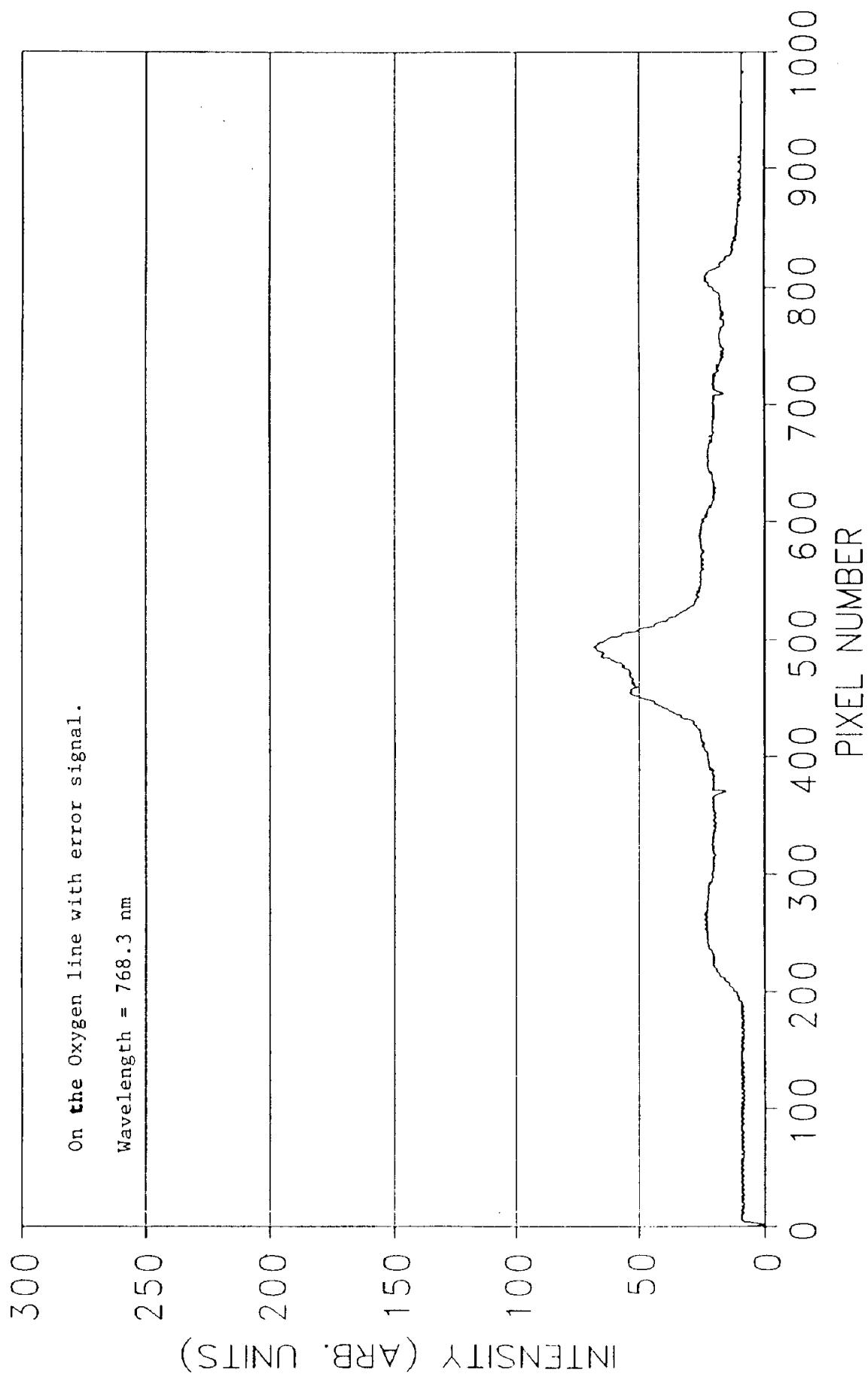
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AVG. DATA



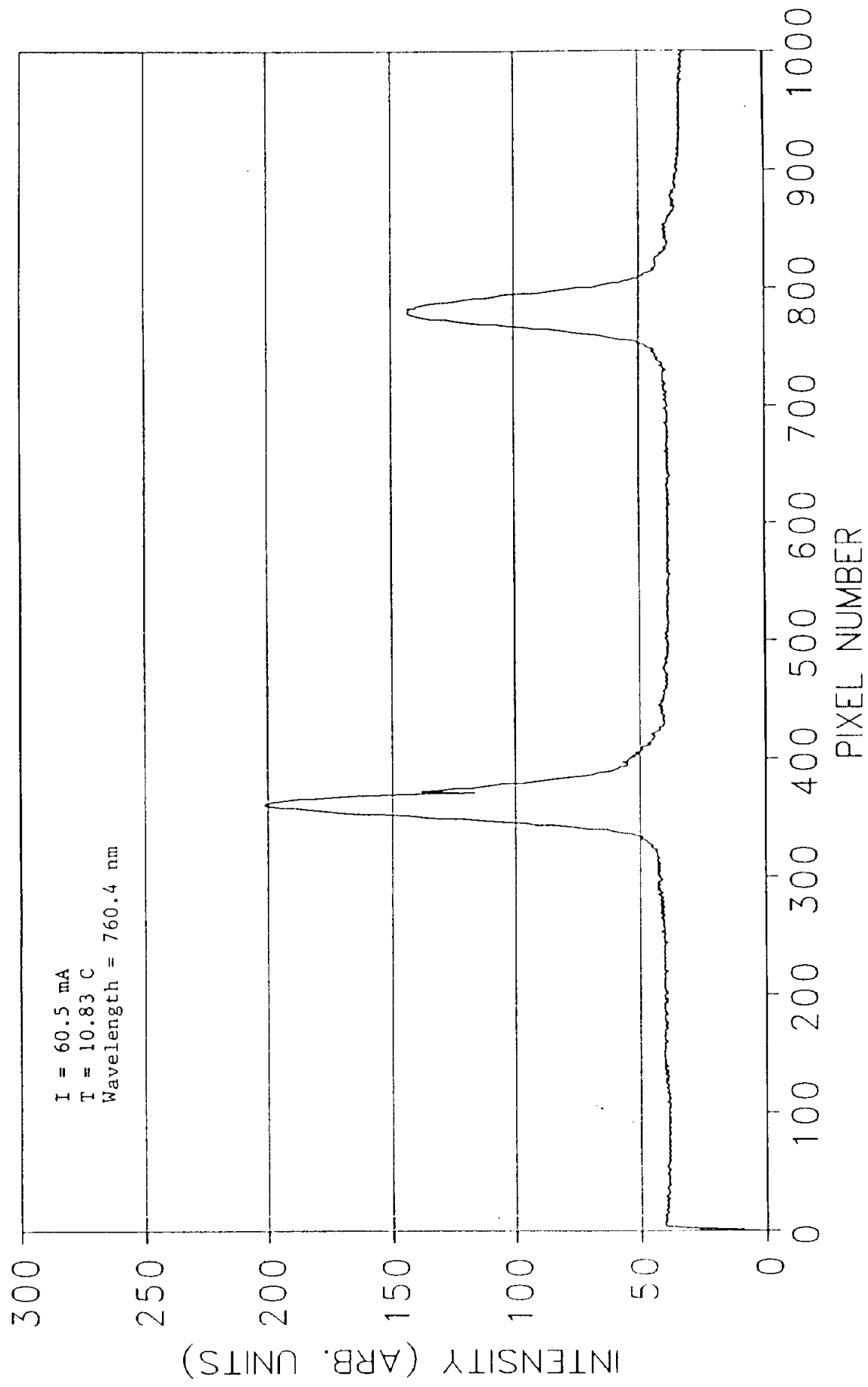
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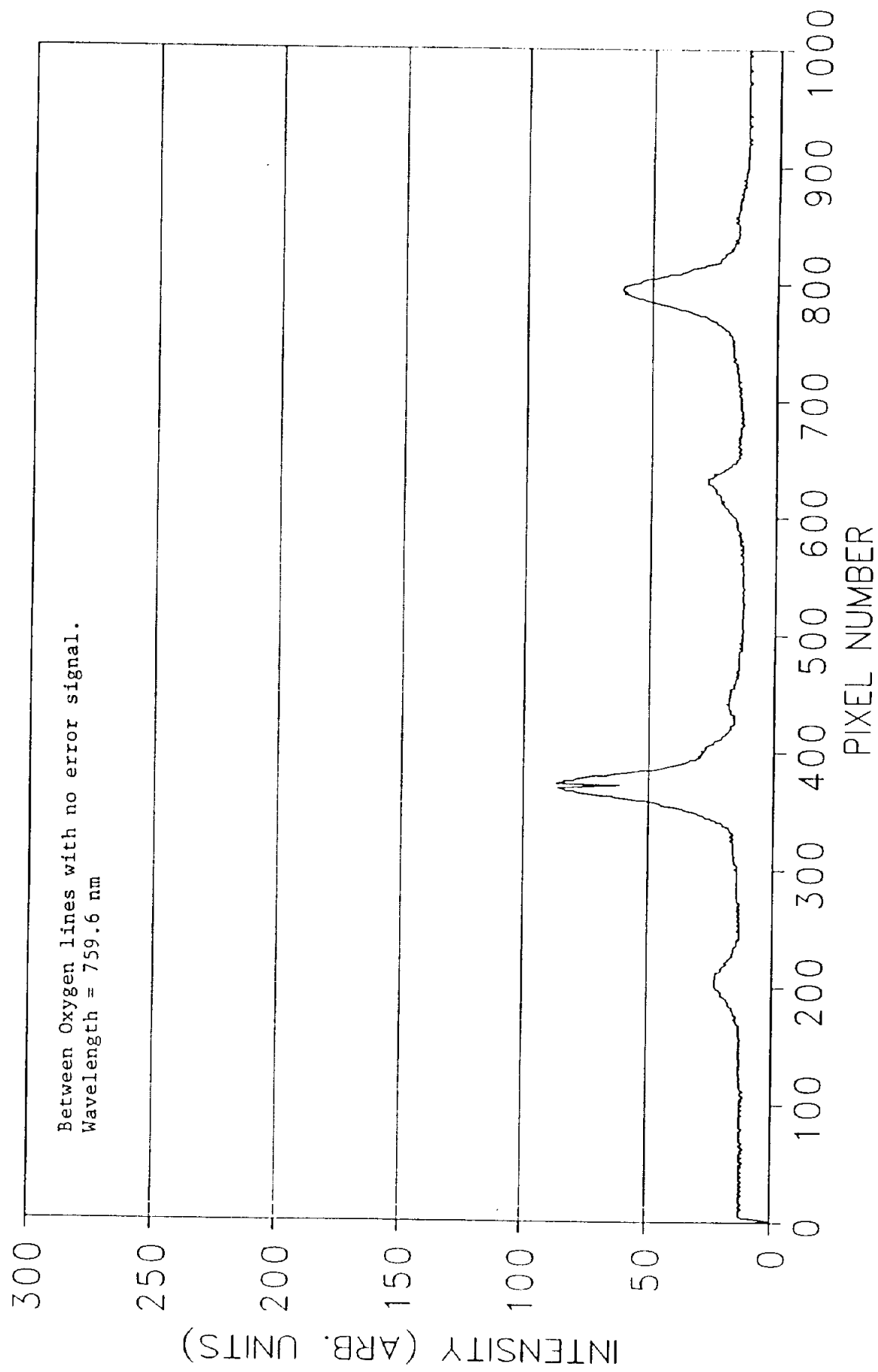
DIOD716.1

AVG. DATA



SEED710.5

AVG. DATA



SEED LASER	AVG. FWHM (cm ⁻¹)	SPECTRAL RANGE (MHz)	CHANGE IN WAVENUMBER (cm ⁻¹)	CHANGE IN SPECTRAL RANGE (MHz)
SEED628.X WAVE- LENGTH = 767.6 nm EDGE OF OXYGEN LINE WITH ERROR SIGNAL	0.014 ± 0.003	420 ± 90	0.027	810
SEEDN628.X WAVE- LENGTH = 767.6 nm ON THE OXYGEN LINE WITH ERROR SIGNAL	0.035 ± 0.009	1050 ± 270	0.021	630
SEEDN702.X WAVE- LENGTH = 768.3 nm ON THE OXYGEN LINE WITH ERROR SIGNAL	0.018 ± 0.007	540 ± 210	0.007	210
*SEED710.X WAVE- LENGTH = 759.6 nm BETWEEN OXYGEN	0.008 ± 0.002	240 ± 60	0.030	900

*shows several modes.

CONCLUSIONS:

— *SUCCESSFUL INJECTION SEEDING OF ALEXANDRITE LASER*

— *MET THE LINEWIDTH REQUIREMENT*

● *BUT FAILED STABILITY REQUIREMENT - DRIFTING*

— *IMPROVEMENTS TO INJECTION SEEDING Q-SWITCHED
ALEXANDRITE LASER:*

● *INCREASED FEEDBACK VOLTAGE TO THE LASER DIODE*

● *FILTER LASER DIODE*

● ● *TEMPERATURE CONTROLLED NARROWBAND FILTERS*

— *ALEXANDRITE LASER:*

● *DIAMOND GRATING (SiC, GROOVED BY EXCIMER LASER)*

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The Use of High Temperature Superconductors
to Levitate Lunar Telescope

by

Beth A. Brown

Graduate Intern Program

Code 684.9

Dr. Peter Chen

NASA Goddard Space Flight Center

Summer 1991

The Use of High Temperature Superconductors to Levitate Lunar Telescope

One project made nearly impossible from either ground-based or low-Earth orbit observational platforms is the search for extrasolar planetary systems. One reason for this is atmospheric scintillation. This causes the object being viewed to appear to shift, thus creating a fuzzy image. What is needed is a lunar observational site. From the moon, the detection of a Jupiter sized planet will be more feasible. Indeed, earth-like planets may well be in the range of lunar telescopic systems. An observation site on the moon would also be used to describe the prevalence of other planetary systems and to study their atmospheric compositions. In combination with a study of pre-planetary disks, this information would enable us to know more about our own solar system¹.

The moon has been chosen as an observational site because of its numerous advantages over the Earth and low-Earth orbits. The lunar atmosphere is, for example, virtually an ultra-high vacuum. This would enable telescopes to be used to their full spectral power. The low density atmosphere also means no wind. Along with the moon's low gravity, this means that structures (both telescope and housing) can be made of extremely lightweight construction with attention only to static thermal loads. Also, since the moon has a slow rotation period, observation times will be longer (indefinite times for polar sites). The sky above the lunar surface is both dark and cold. The darkness of the sky is a result of the absence of air glow. Thus, deep observations may be made even in daylight (with proper shading of the telescopes). The coldness reduces or eliminates the need for cryogenics to cool optical components^{2,3}. It is this attribute that forms the basis for a lunar telescope as designed by Dr. Peter Chen (Code 684.9).

My job this summer was to assist in the construction of a mirror model of this telescope. The mirror is of a simple construction making use of high temperature superconductors and electromagnets to levitate, point, and move the mirror. The feasibility of this type mirror lies in the fact that temperatures on the moon are low enough to allow superconductors to become fully conducting without the need for additional cryogenics. In addition, the low gravity of the moon makes it possible to obtain a rigid reflecting mirror without a massive support system.

The mirror itself has not been made yet. The model will be made by a replication process using a glass lens as a mandrel. A thin layer of gold will be deposited as the reflecting surface. A layer of graphite epoxy will then be applied as a lightweight rigid backing. The mirror will be attached to an annular support frame to which the superconductors will be fixed. The material for the support ring has not been determined yet. There are several candidates being considered, all of which are low-density, rigid (in space) materials. These include aluminum metal-matrix composites, polystyrenes (for example, styrofoam), and polyurethanes.

The entire structure will then be suspended above electromagnets. By varying the current going through each electromagnet, the height and orientation of the mirror can be adjusted. As an

alternative to placing superconductors above the electromagnets, it may be possible to coat the back of the mirror with a magnetic thinfilm and suspend the construction above superconductors.

In preparation for the use of superconductors to lift the mirror, I observed the levitation of several Y-Ba-Cu-O superconductors with the use of a small permanent magnet and liquid nitrogen (to cool the superconductor). Levitation is the result of the Meissner effect which is the expulsion of magnetic field lines by a superconducting material. I then ground down two superconductors to measure differences in levitation properties with respect to thickness. This was done by placing the superconductors, including one of original thickness (4mm), above a large magnet. One superconductor was ground to approximately 2mm; the other to about 1mm. From these experiments, I found that, when levitating a small magnet above a superconductor, levitation height increased with thickness. When suspending a superconductor above a magnet, however, levitation height decreased with thickness.

In the next stage, I experimented with different configurations of superconductors, magnets and variable magnetic fields. After some research^{4,5}, it was found that if an electromagnet (a solenoid connected to a DC power supply in this case) were to be placed above the permanent magnet (in turn suspended above the superconductor), the levitated height of the magnet could be increased. This increase in height was due to the attractive force from the electromagnet adding to the repulsive force from the superconductor. It was determined that the range of vertical motion produced in this manner was finite. There exists a point (maximum height) at which the flux lines snap and the magnet is pulled toward the electromagnet.

Continuing with this line of experimentation, I attached two cylindrical magnets to either end of a split tongue depressor (approximately 4.32g) by means of an epoxy resin and tape. Three superconductors were used in each of two petri dishes in order to permit the depressor to clear the edges of the dishes. It was found that when one end of the construction was further lifted under the electromagnet, used in the single magnet experiment, the other end remained fixed in place. This helped confirm the stability of the suspended object.

I then proceeded to add ever increasing weight to the construction in anticipation of what would be required to lift the model mirror (calculated to be approximately 14.2g). By increasing the amount of current flowing through the solenoid, and by lowering the height of the solenoid over the end of the depressor, I was able to maintain levitation to a weight of 10.52g. At this point, I noticed a slight levitation; however, the electromagnet was so low over the construction as to severely limit any vertical movement that may have been possible.

In conclusion, it is believed that with a construction of four magnets suspended over four bulk superconductors (or vice versa) there should be no problems lifting the model mirror and stabilizing it at different positions. It may be necessary to increase the size and quality of the superconductors and/or magnets in order to achieve this.

References

1. B. F. Burke, "Astrophysics from the Moon" American Institute of Physics Conference Proceedings 207, pp. 67-70 (1990).
2. H. J. Smith, "Astrophysics from the Moon" American Institute of Physics Conference Proceedings 207, pp. 273-281 (1990).
3. P. O. Lowman, Jr., "Astrophysics from the Moon" American Institute of Physics Conference Proceedings 207, pp. 315-327 (1990).
4. P. J. Ouseph, Appl. Phys. A 50, pp. 361-364 (1990).
5. T. Takamori, J. J. Boland, and D. B. Dove, Rev. Sci. Instrum. **61**(7), pp. 1984-1986 (1990).

Viewgraphs

- * Objective summary
- * Table of lunar advantages
- * Basic mirror design
- * Levitated construction without electromagnet
- * Levitated construction with electromagnet
- * Table of experimental results

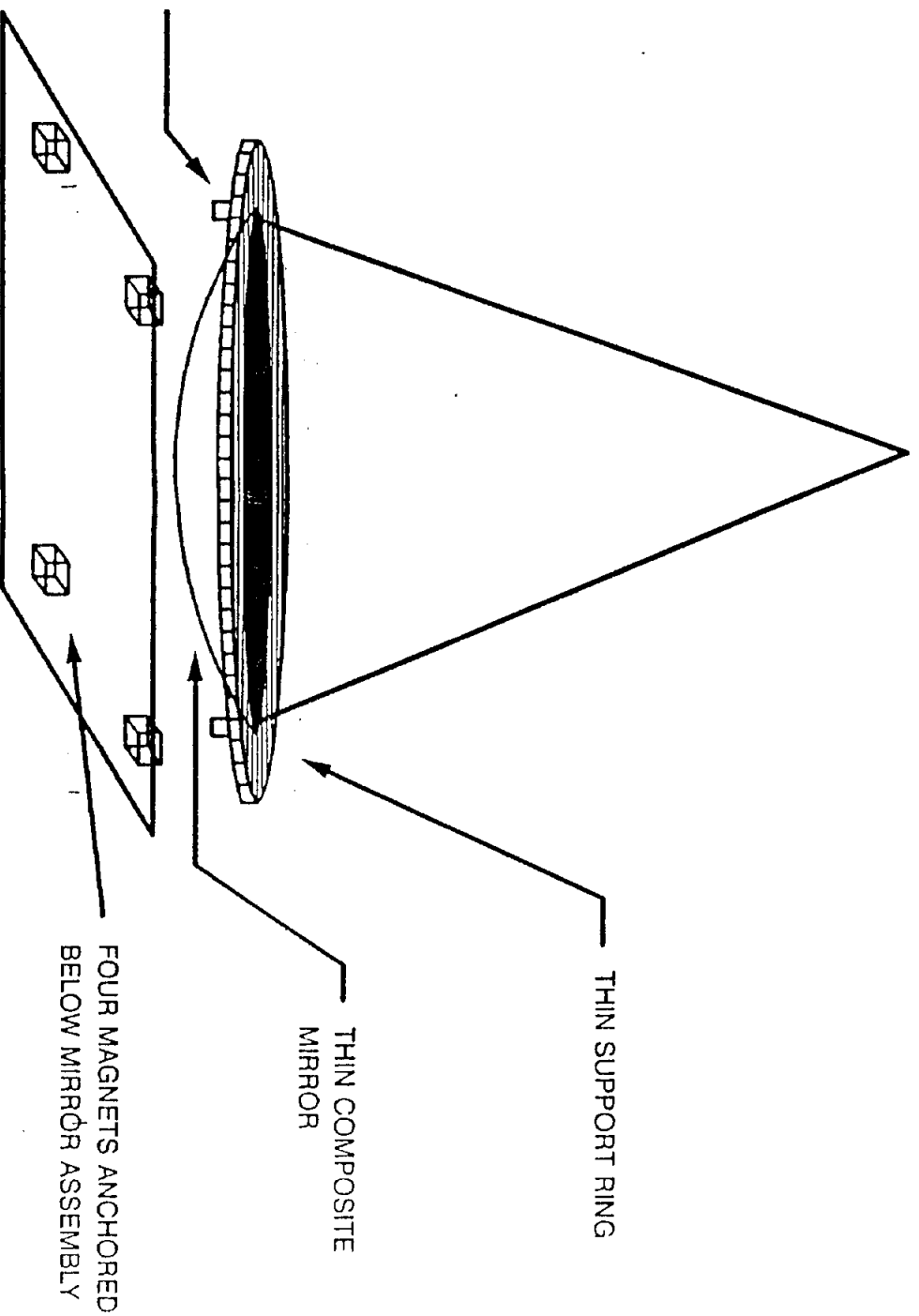
Beth A. Brown
Howard University
Graduate Intern Program
Code 684.9

Objective

To assist in the construction of a lunar telescope mirror model by conducting research on composite materials and other lightweight, rigid materials, and by determining how much weight can be levitated by available superconductors.

BASIC DESIGN

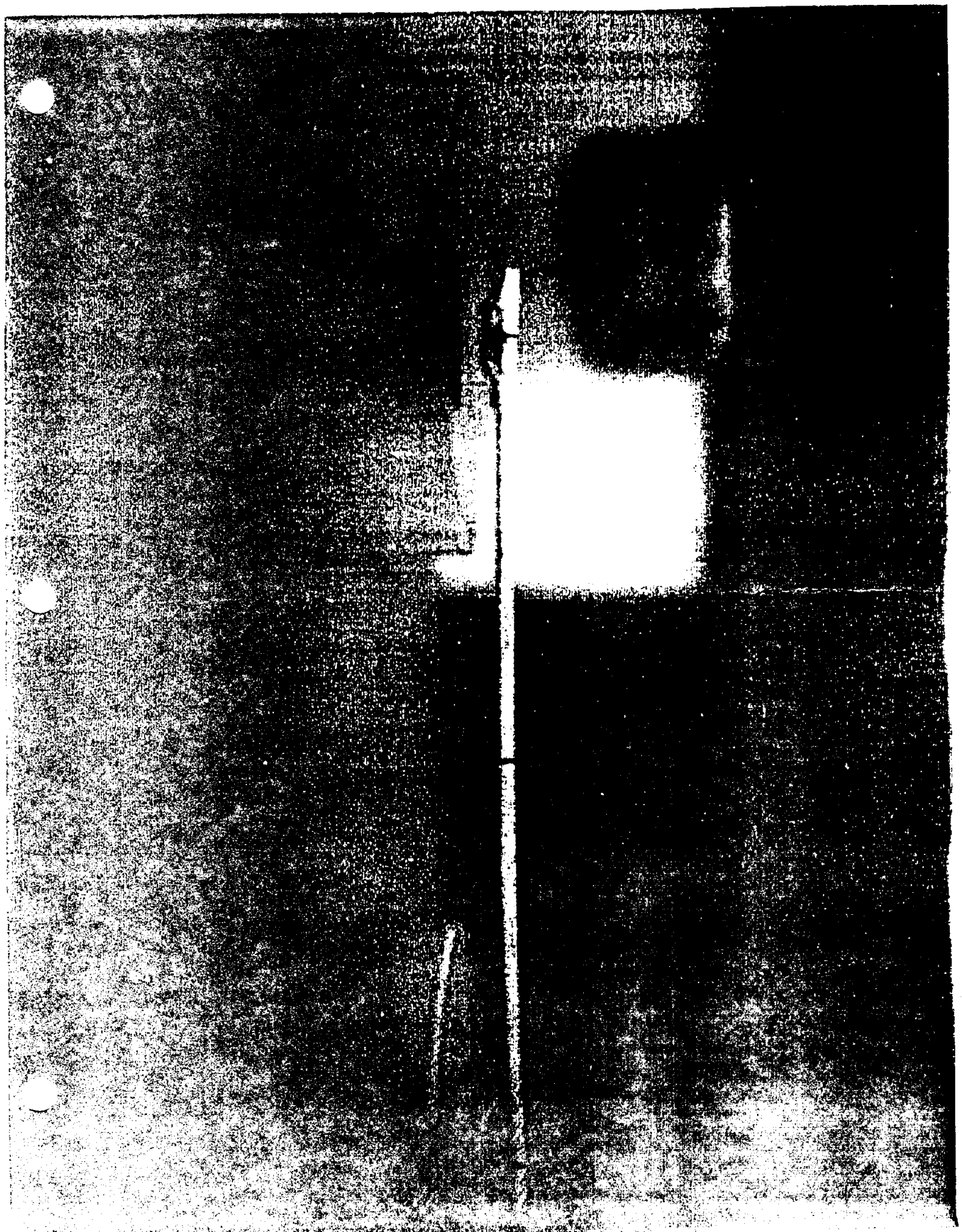
MEISSNER EFFECT TELESCOPE PRIMARY MIRROR

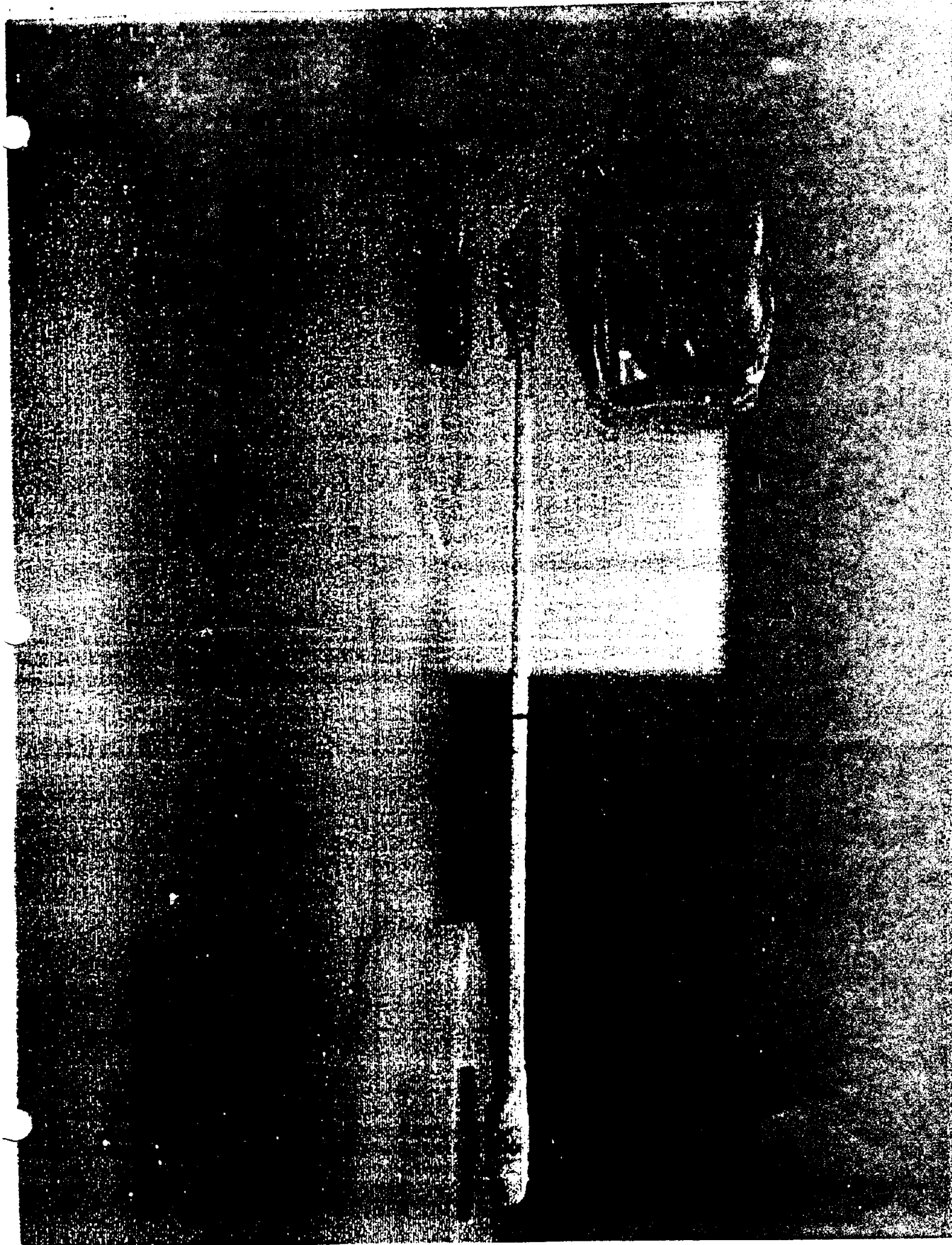


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Advantages of the Moon as an Observational Site

- * ultra-high vacuum
telescopes can be used to their full spatial resolving power
- * dark sky
virtually free from air glow; from any site, the Earth appears fixed; with proper shading, deep sky observations can be made
- * cold sky
reduce or eliminate need for cryogenics
- * low gravity
structures much lighter and of less expensive construction; debris falls to surface rather than floating
- * lunar farside
ideal for limiting sensitivity (site which never sees Earth in the sky)
- * absence of wind
structures built with attention only to static thermal loads
- * proximity to Earth
round-trip communication times < 3 seconds
- * room
for laying out systems of instruments
- * raw material
virtually inexhaustible supply of many essential materials





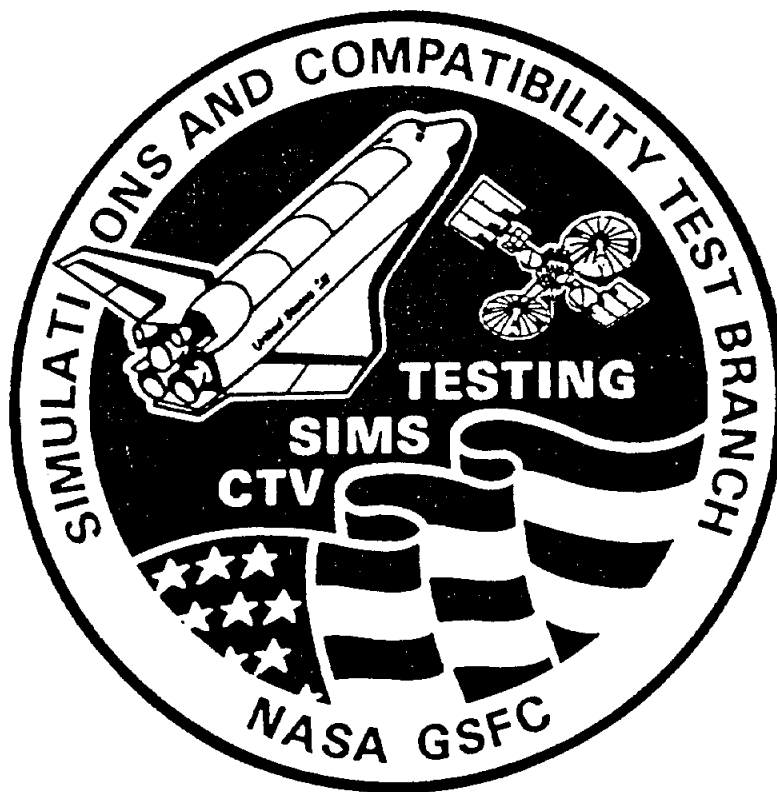
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Mass (g)	Magnet above s.c. w/o electromag. w/electromag. (from vertical center)		Height (mm)	Current (A)
4.32	3.5	8.0	28	.45
6.34	1.5	5.75	26	.55
7.72	1.0	4.0	21	.56
10.52	0.0	.05	18.5	.60

National Aeronautics and Space Administration
Goddard Space Flight Center
Maryland

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Modifications for a Communication Interface Board



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University of Puerto Rico
Mayaguez Campus
Goddard Graduate Intern Program
State of North Carolina
Agricultural and Technical State University

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Acknowledgements

Through these lines, I would like to thank Dr. Clinton Lee for giving me the opportunity to be part of this Summer Goddard Graduate Intern Program. Also, I would like to thank the people at code 515 for their confidence, professionalism and friendship.

Jesus, my lord, my God ... thanks.

CDJ

Preface

This report is presented as a partial requirement for the completion of the Goddard Graduate Intern program. A description of the work developed as well as goals, procedures, and realizations are here summarized.

As a Goddard graduate intern, I had the opportunity to work in the Simulations and Compatibility Test branch (code 515) specifically in the Simulations Operations Section (code 515.2). This branch is responsible for developing and conducting simulations and compatibility test to stress and validate mission operations and data systems. Their resources are used in the initial check out of a flight mission interface with the space network (SN) and the ground network (GN). Among other responsibilities, they determine spacecraft compatibility with network tracking, telemetry, timing and command systems. They also verify compliance with Aerospace Data Systems Standards (ADSS) and conduct simulations for the purpose of training, development and interface verification.

My work at code 515.2 was related to the modification of a Communication Interface Board (CIB) using Erasable Programmable Logic Devices (EPLD). The interface will provide to Data General and Rolm computers (fig. # 1) a serial input/output link with the exterior world. The I/O board will enable the computer to simulate a spacecraft (fig. # 2) and allows the Simulation and Compatibility Test branch to test the Ground Network tracking, telemetry and

command parameters.

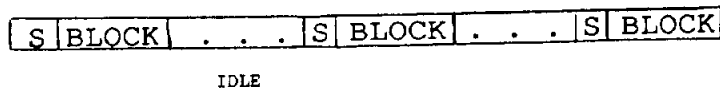
Objective

The objectives of the assignment are summarized next. First, it is to modify a Communication interface board by using Erasable Programmable Logic devices to replace standard SSI and MSI logic. Second, it is to simulate selected portions of the schematics using Altera Maxplus 1990 and Maxplus 2 1991 CAD programs. Finally, to replace a First Input First Output (FIFO) device as well as a serial to parallel and parallel to serial converters with new FIFO's that have internal converters.

Procedure

The Communication Interface Board is an input-output device designed to provide a serial path between Data General and Rolm computers and the outside world. Its operation mode is described as the following: a block of data or a frame of telemetry (fig. # 3) is received in series,

Block Transmission



Serial Transmission



Fig. # 3 Blocked and Serial Transmission.

the incoming data is compared to a synchronization pattern previously loaded in parallel by the computer to the CIB (fig # 4), a serial to parallel conversion is performed and the data is transferred directly into the computer's memory. Two load patterns (loadpatt) and load mask (loadmask) signals are required since the sync pattern is 32 bits wide; the computer bus is only 16 bits. After comparing the data, one of three possibilities can arise: first, that the incoming data was not a sync pattern, second, that the incoming data matches the defined pattern (data true becomes asserted) and finally, that the received data be the inverse of the

predefined sync pattern, in which case, the data is said to be inverted. If the second possibility happens, the clock enable output signal in the correlator becomes asserted low and the data is received. If the third possibility occurs, the clock enable output signal becomes asserted low and the incoming data is first inverted and then received by the CIB. Otherwise, the incoming data is ignored. A copy of the simulation of the correlator circuit is included (fig. # 5).

Going back to fig. # 4, each box is nothing but a symbolic representation of a digital circuit created by a Computer Aided Design (CAD) program named Altera. This program allows engineers to accommodate exact equivalents of Small Scale Integrated (SSI) and Medium Scale Integrated (MSI) circuits into one single chip (fig # 6). The heart of an Altera Multiple Array Matrix (Max) EPLD is the Logic Array Block (LAB) (fig. # 7). It is composed of a macrocell array, an expander product term array and an I/O control block. A macrocell is a group of product terms (p-terms) (fig. # 8) feeding a sequential logic element while an expander is a group of uncommitted single product terms. A Max device consists of multiple LAB's linked together to through a Programmable Interconnect Array (PIA) (fig. # 9).

By using this technology, a Direct Memory Access (DMA) controller was redesigned (fig # 10). As in figure # 4 each box is nothing but a symbolic representation of an Altera device or that is to say, a digital logic circuit realizing a specific function. The architecture of Data General computers is described below to

and in the understanding of the CIB's operation.

The communication channel through which information passes between the computer and the CIB is called the I/O bus. Since it is shared by all the controllers as well as by the CPU, it is a half duplex bus so, only one operation occurs at a time. The information transferred between the computer and the CIB is classified into three groups: Status information, that tells the computer the state of the CIB; Control information, that tells the CIB what to do and Data information that can be read by the computer or written to the CIB. The information is transferred using one of the following controllers: the Programmed I/O (PIO) controller, in which a word (16 bits) or part of a word is transferred between an accumulator in the CPU and the CIB; the Data Channel (DCH) controller, through which a block of words is transferred (one word at a time) between the computers memory and the CIB; and the Burst Multiplexer Channel control, through which a block of words is transferred synchronously. The DCH transfer procedure is summarized as follows: a request for DCH bus is issued by the interface, bus access is granted, the address of a word is put in the computer bus, (16 bits bus) and the word is transferred. Each time a word is to be transferred, the procedure is repeated. Under the Burst Multiplexer Channel control, a burst of words is transferred once access is granted. The memory address (21 bits wide) and the number of words inside the burst needs to be specified in order to start the transmission.

The previous discussion presented a brief summary of the Data

General Computers structure. Now, the DMA controller can be discuss. The DMA controller is divided into four stages: word counter # 1 and word counter # 2, the burst counter, the address register, and a 4 to 1 16-bit multiplexer. The first stage receives the two's complement of the number of words to be transferred. Word counter # 1 is incremented by one each time a word goes into the FIFO. When an overflow occurs, or when all the words are in the FIFO, the word counter reloads itself and instruct the correlator to begin looking for new data again. Word counter # 2 (PR3CNTR) (fig. # 11) is incremented each time a word is transferred out of the FIFO. When an overflow occurs, a DONE flag becomes asserted and interrupts the computer. The computer then has the option of restarting the CIB, halting the CIB, or modifying control information. The word counter # 1 is read using the rising edge of the DIB control signal while the word counter 2 is read using the falling edge. It is done through a toggle flip flop and a multiplexer (see seqckt in fig. # 10). The PR4CNTR box in figure # 10 (see also fig. # 12) includes the address register (21 bits wide for the BMC and 16 bits for a DCH transmission) and the BMC burst counter which indicate the number of words per burst to be transferred. Finally, the 16 bits 4 to 1 multiplexer (16BCMUX) (fig. # 13) selects which register will be read by the computer. The following commands are used by the computer to control the CIB:

DOA - Load address

DIA - Read Address

DOB - Load word counter

DIB - Read word counter

DOC - Load BMC word

DIC - Read BMC word

Each stage was individually tested and its simulations are here included as well as the digital circuit logic inside each symbolic representation.

To avoid a lack in systems performance due to different transfer rates between the computer and the CIB, First Input First Output (FIFO) memory buffers are required. FIFOs allow data to be stored and read sequentially. Serial to parallel / parallel to serial conversions can also be performed by using IDT 72103 CMOS parallel-serial FIFOs. For instance, in the modified CIB, this single chip replaces the old FIFOs and the serial to parallel / parallel to serial circuit associated to it. Figure # 14 shows how the IDT 72103 CMOS are connected. The SI/PI pins are grounded telling the chip that the incoming data will be transferred in series. The input pins Di (i from 0 to 8) are used to indicate the size of the word. For instance, the word wide is 7 bits while in the first chip, it is 9 bits wide. Pin D8 in chip # 1 is connected to SIX of chip # 2 to create an expansion (9 bits from chip #1 plus 7 bits of chip # 2 equal to a 16 bits word). Each time a 16 bits word is read, a WRITE pulse is sent through the D6 pin. To transfer the data to the computer bus, a read pulse must be sent.

Illustrations

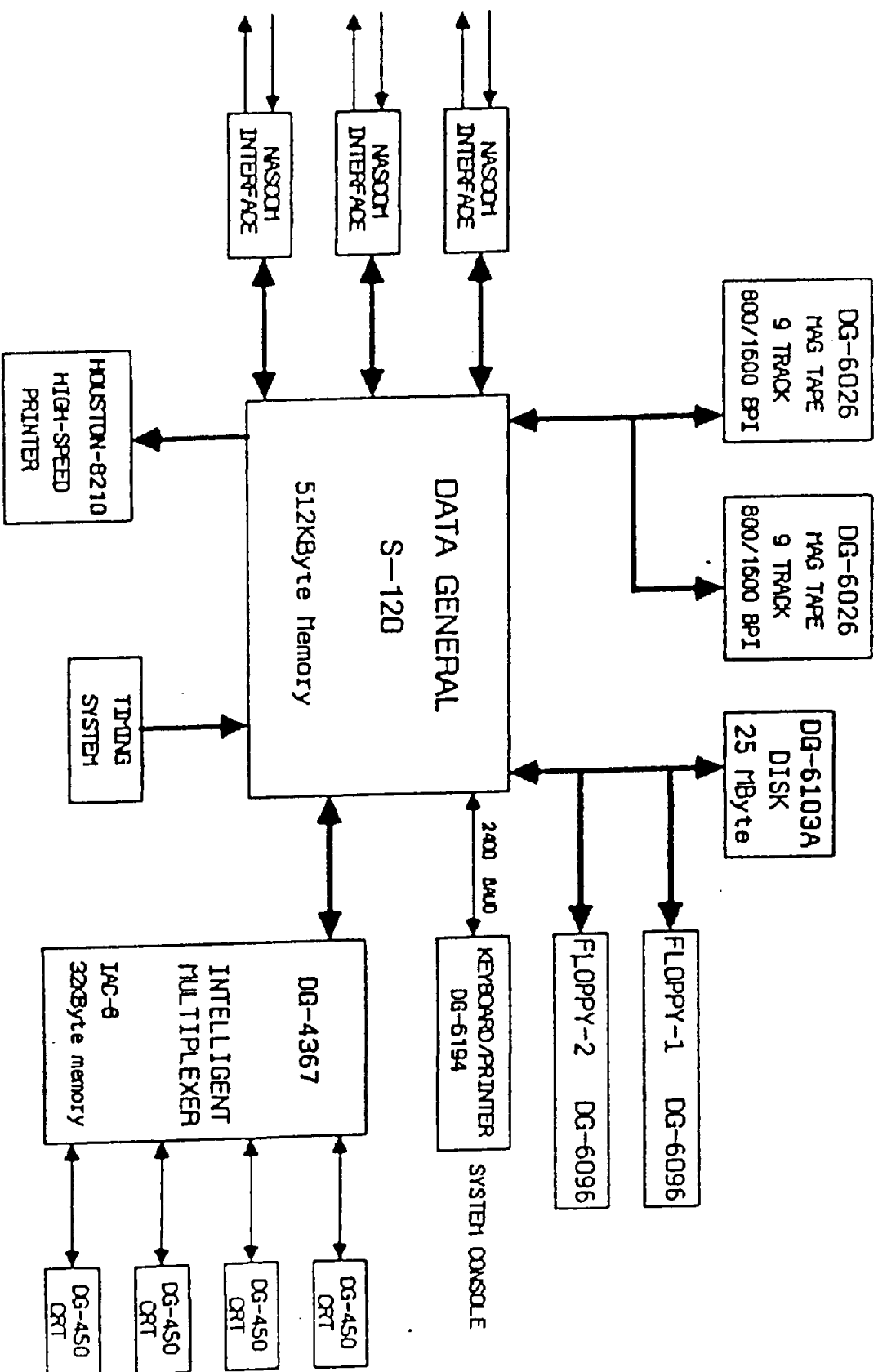


Fig. # 1 Data General S-120 System

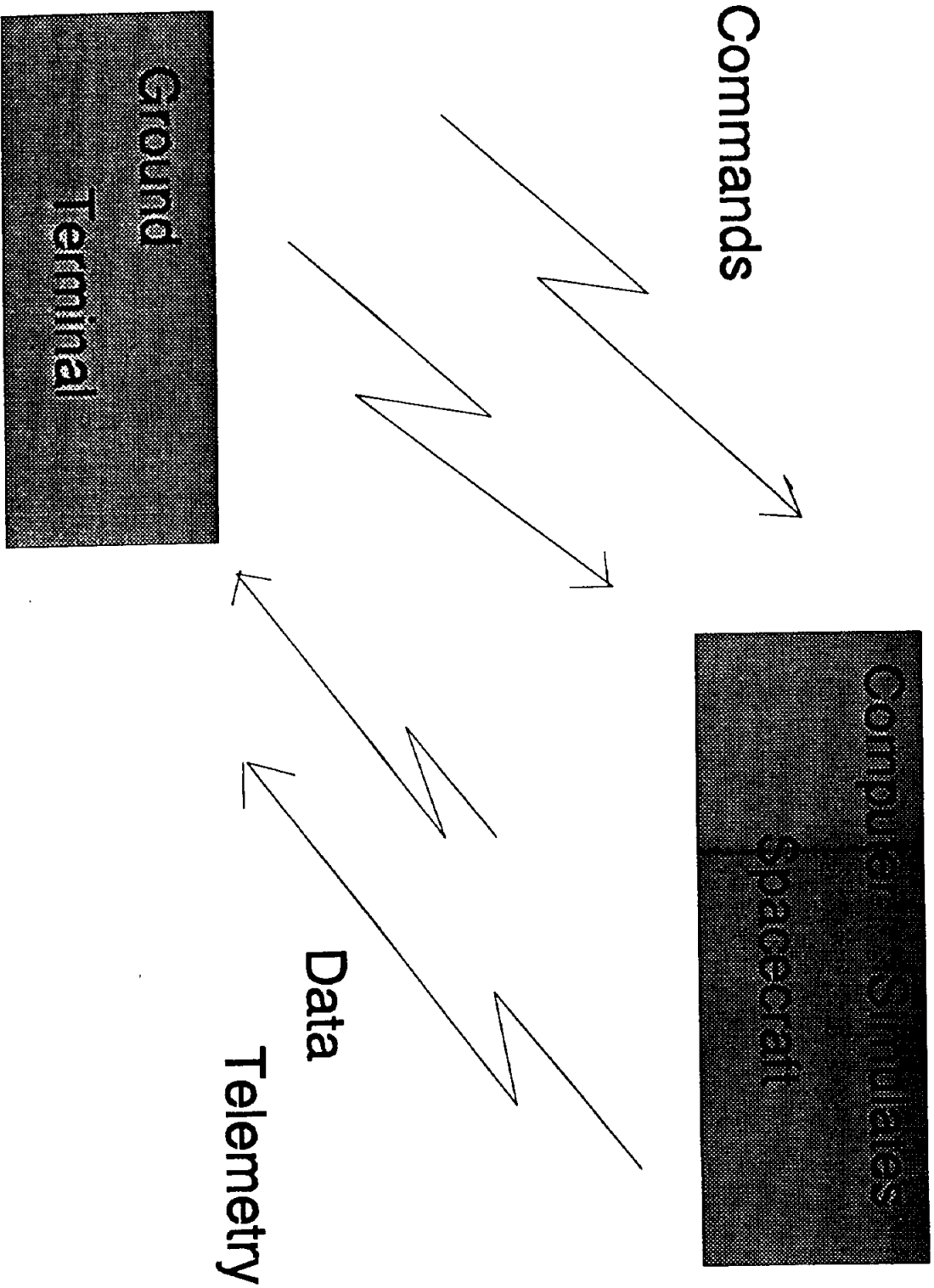


Fig. # 2 An plication for the CIB.

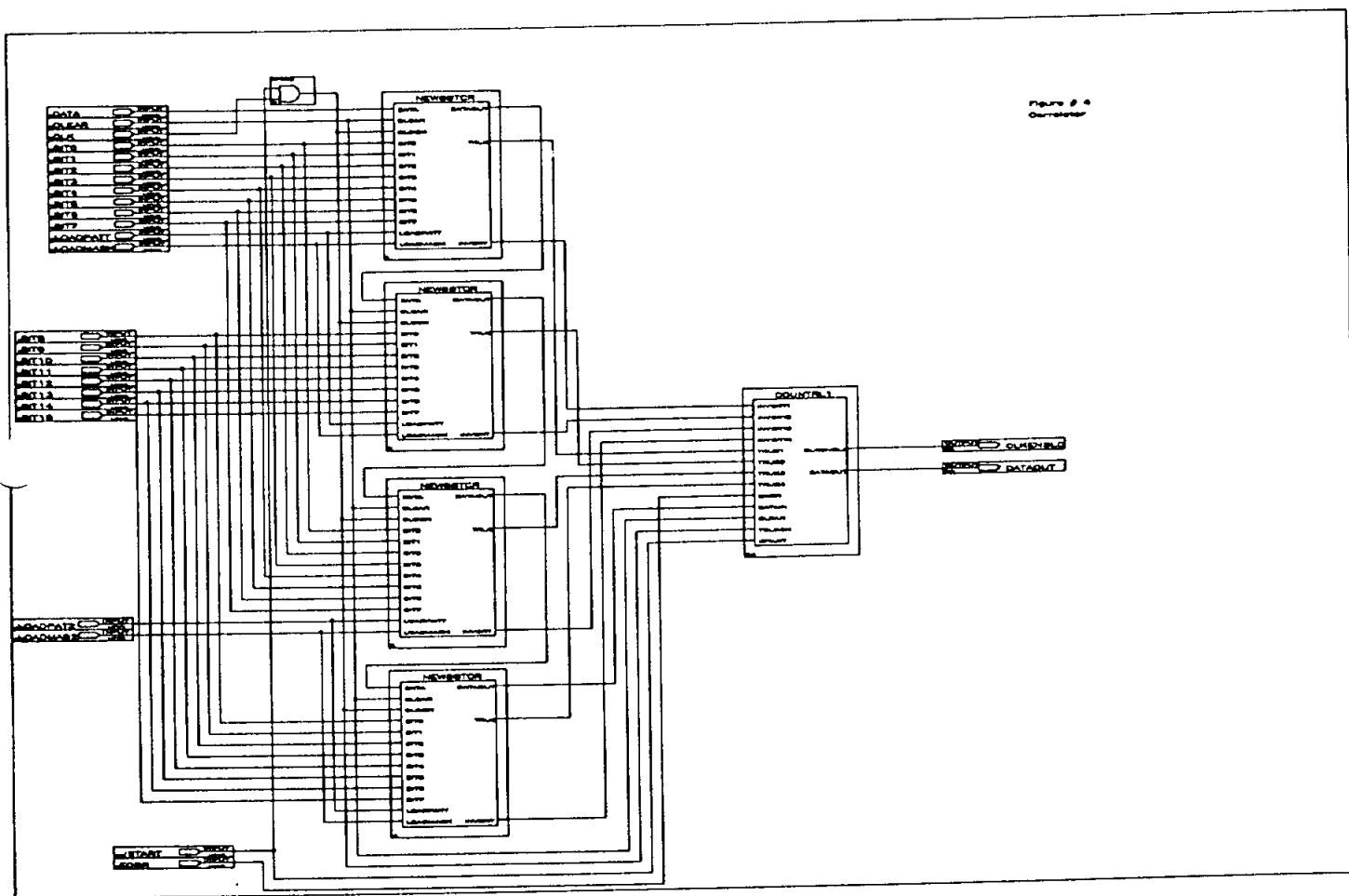


Fig. # 4 Correlator

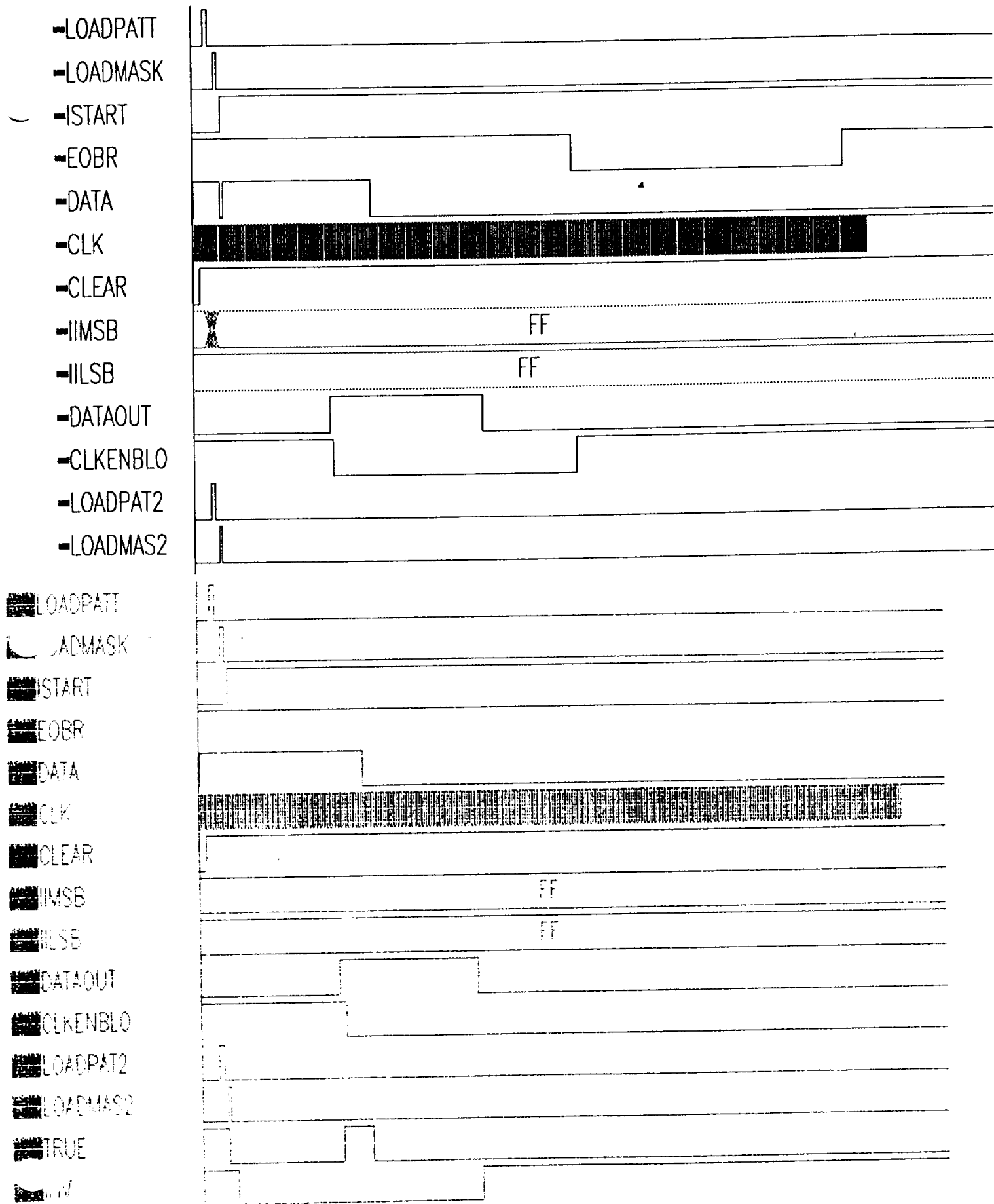


Fig. # 5 Correlators Simulation



Fig. # 6 Altera EPM128 Chip

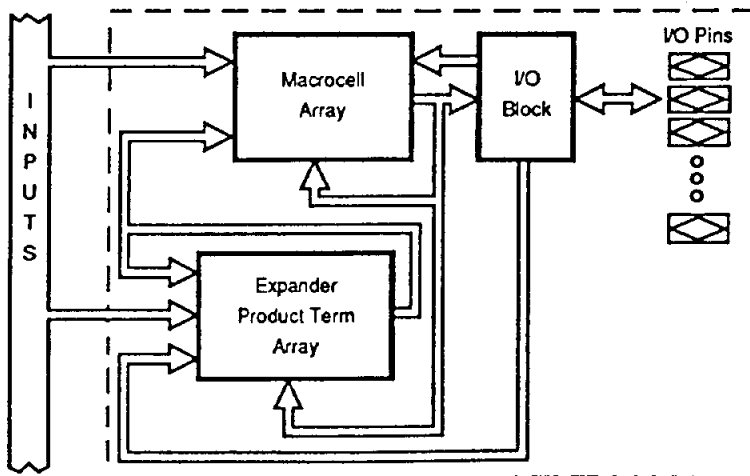


Fig. # 7 Logic Array Block

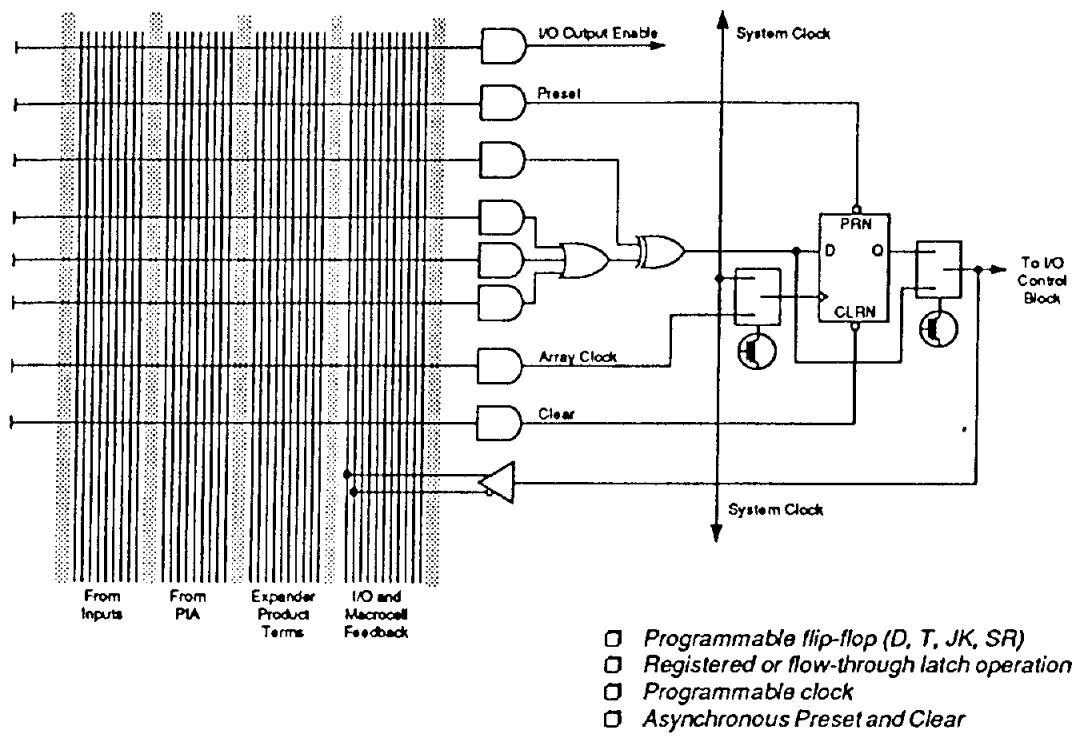


Fig. # 8 Macrocell Block Diagram

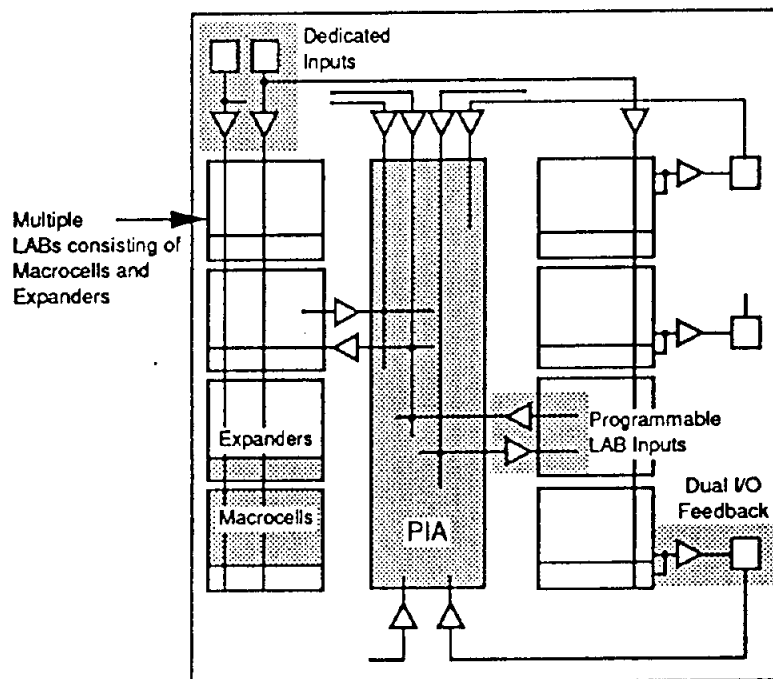


Fig. # 9 Programmable Interconnect Array Diagram

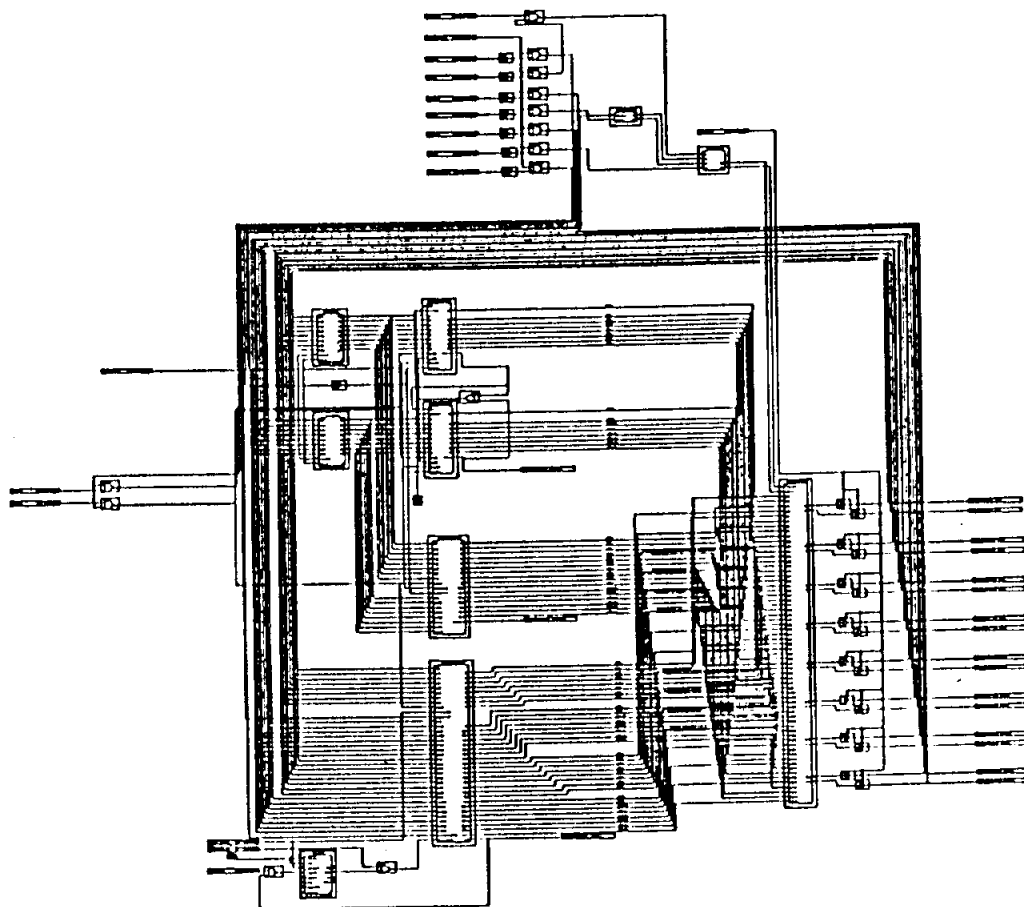


Fig. # 10 DMA Controller

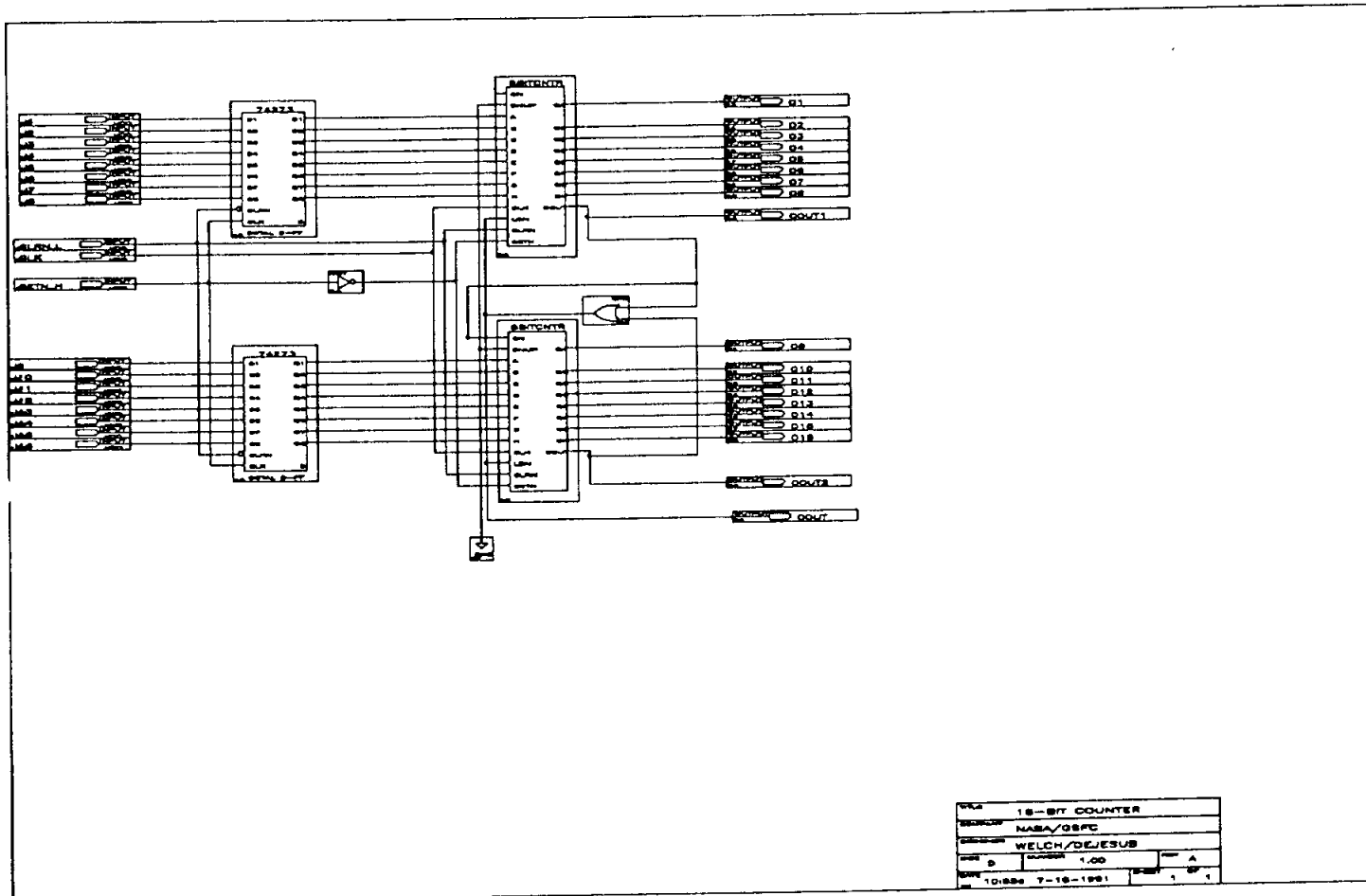
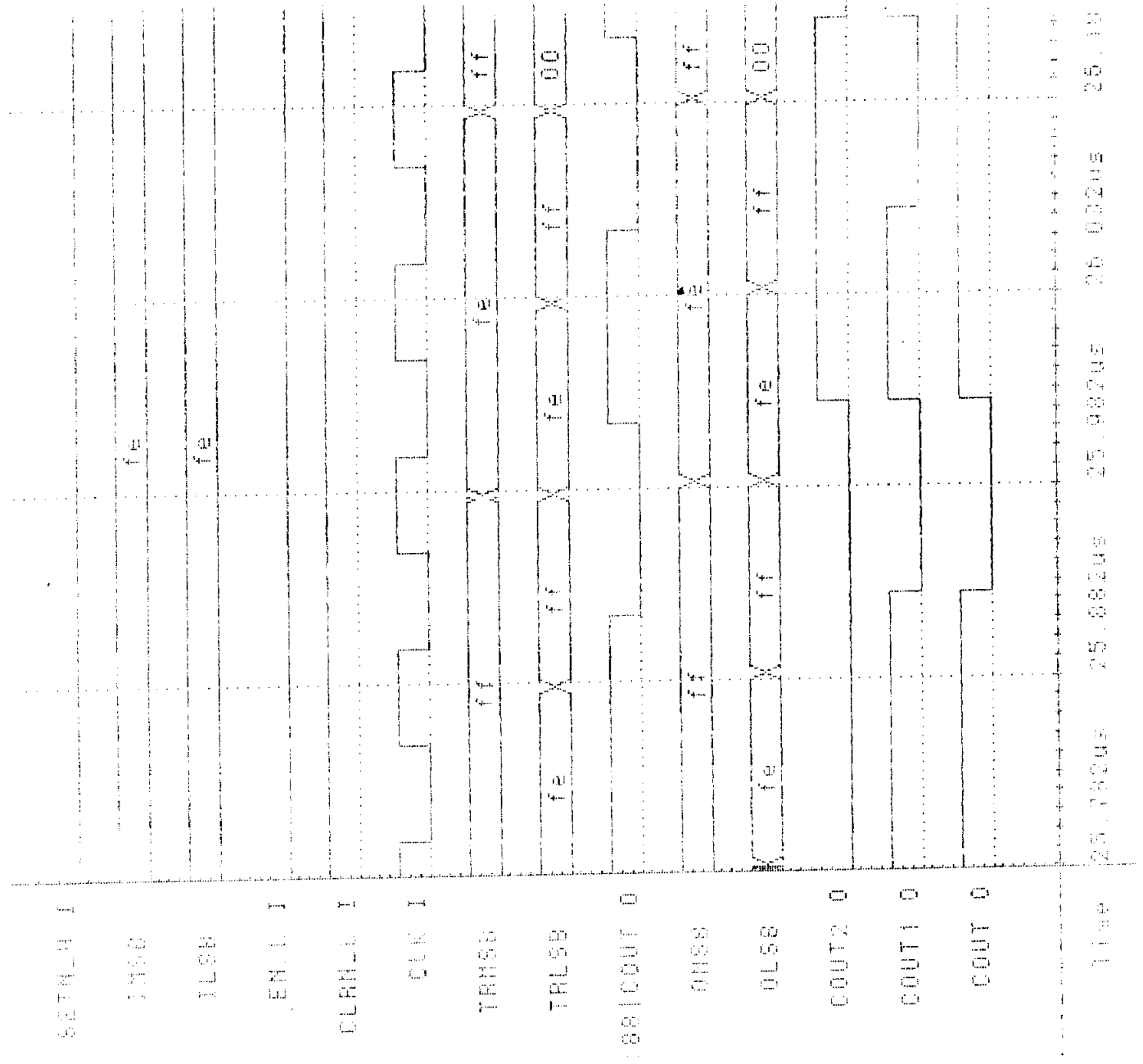


Fig. # 11.1 Word Counter # 1



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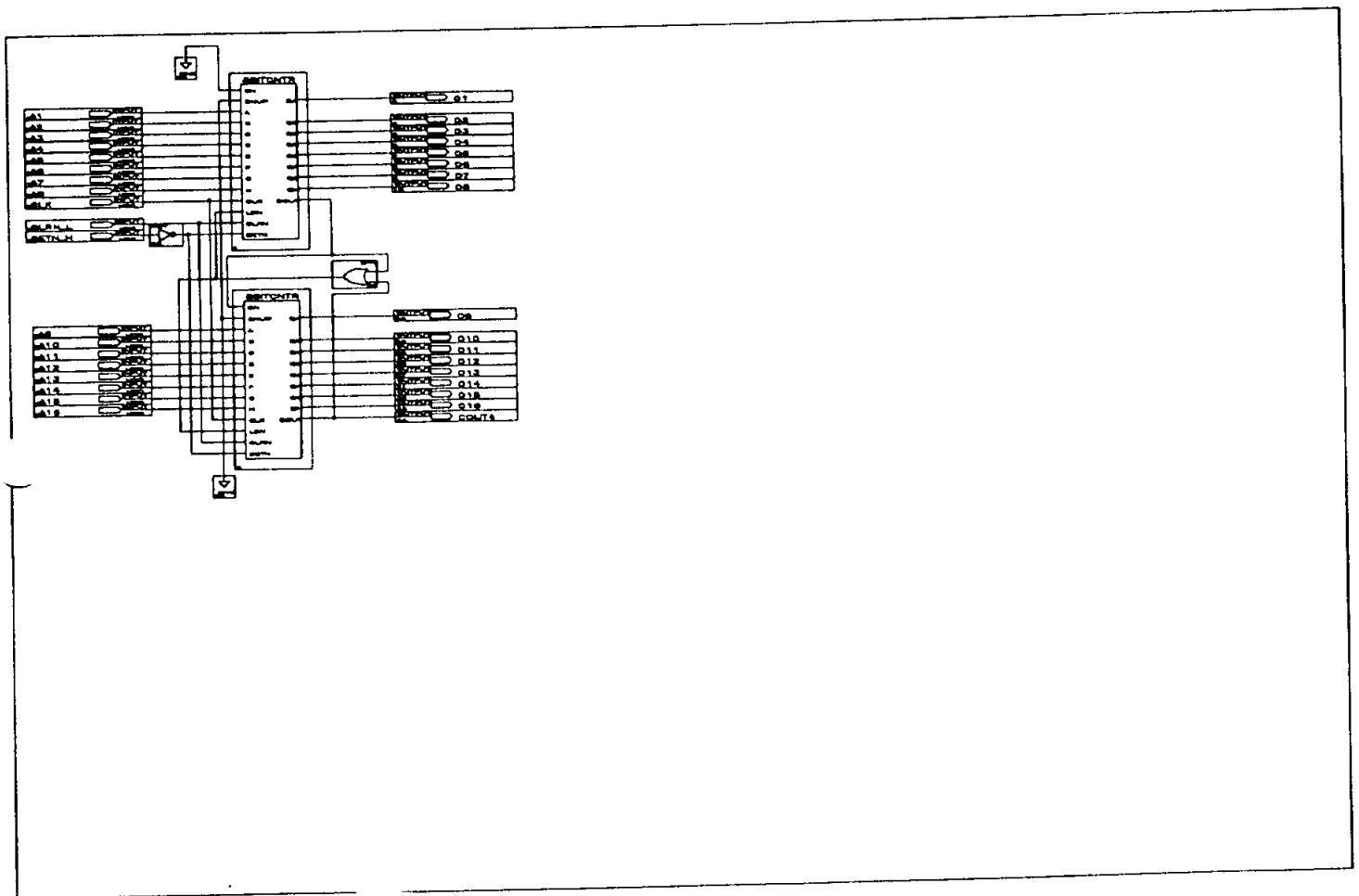
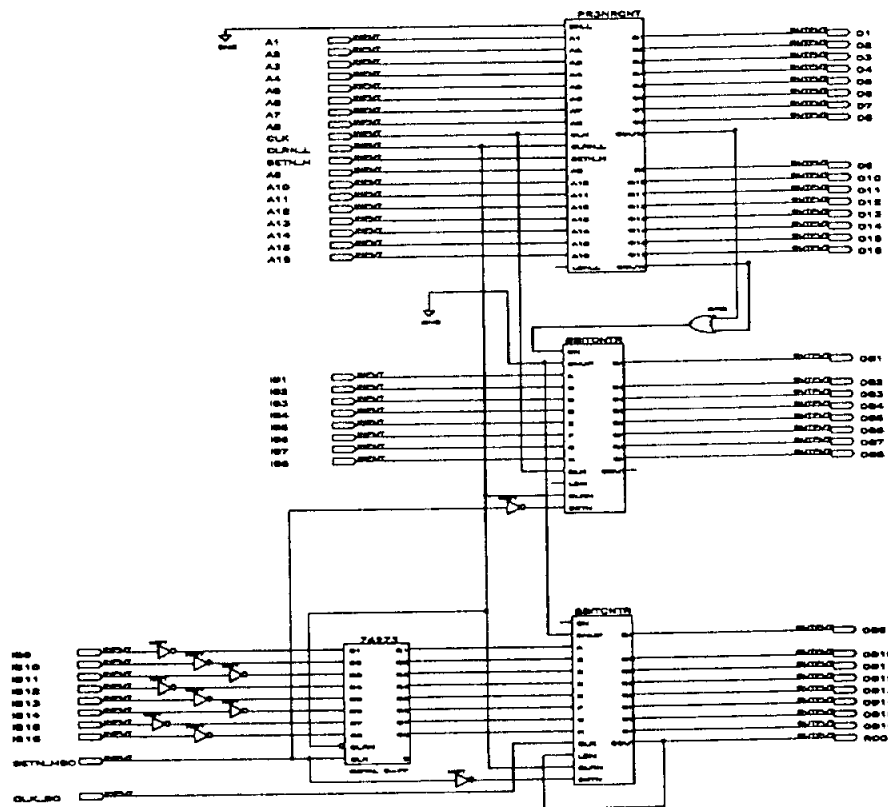


Fig. # 11.2 Word Counter # 2



BMC COUNT, AND ADD. REG.			
NASA/OSPC			
WELCH/DEJESUS			
Rev. D	Rev. 1.00	Rev. A	
DATE	2-28-67	7-18-1991	1 5

Fig. # 12 Address Register and BMC Counter

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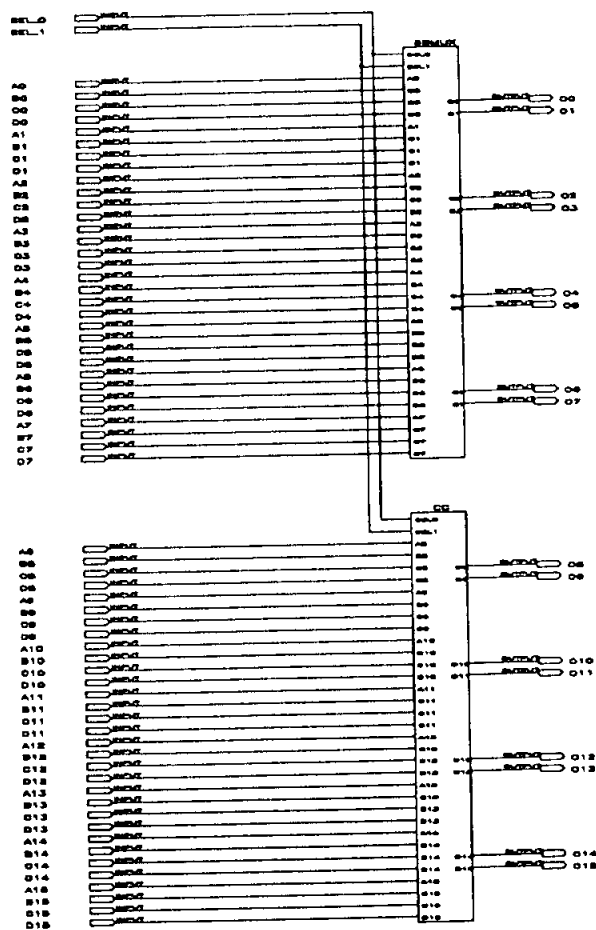


Figure # 13
16 Bits 4 to 1 Multiplexer

Fig. # 13 16 Bits 4 to 1 Multiplexer

Results

The results of the assignment are summarized as follow:

- Modifications for a communication interface board had been performed. Its DMA controller as well as its Correlator had been reduced to two single chip.

- Each part in the Correlator as well as in the DMA was individually tested to ratify its behavior.

- The Correlator was also simulated as a whole that is to say, with all its parts linked together. With respect to the DMA , it could not be simulated due to unrecoverable application errors in Microsoft Windows. Nevertheless, a copy of all the schematics was sent to Altera's bulletin board system in order to determine the nature of the problem and how to solve it.

Bibliography

Altera Maxplus Manuals, The Altera Corporation, San Jose CA., 1986

Altera Maxplus 2 Manuals, The Altera Corporation, San Jose CA., 1991

Eclipse MV/2000 Series Interface Designer Guide, Data General Corporation, USA, 1986

Welch, J.P., **A New Interface for Data Communication**, NASA/GSFC, Maryland, 1989.

Appendix

**National Aeronautics and Space Administration
Goddard Space Flight Center
Maryland**

Modifications for a Communication Interface Board

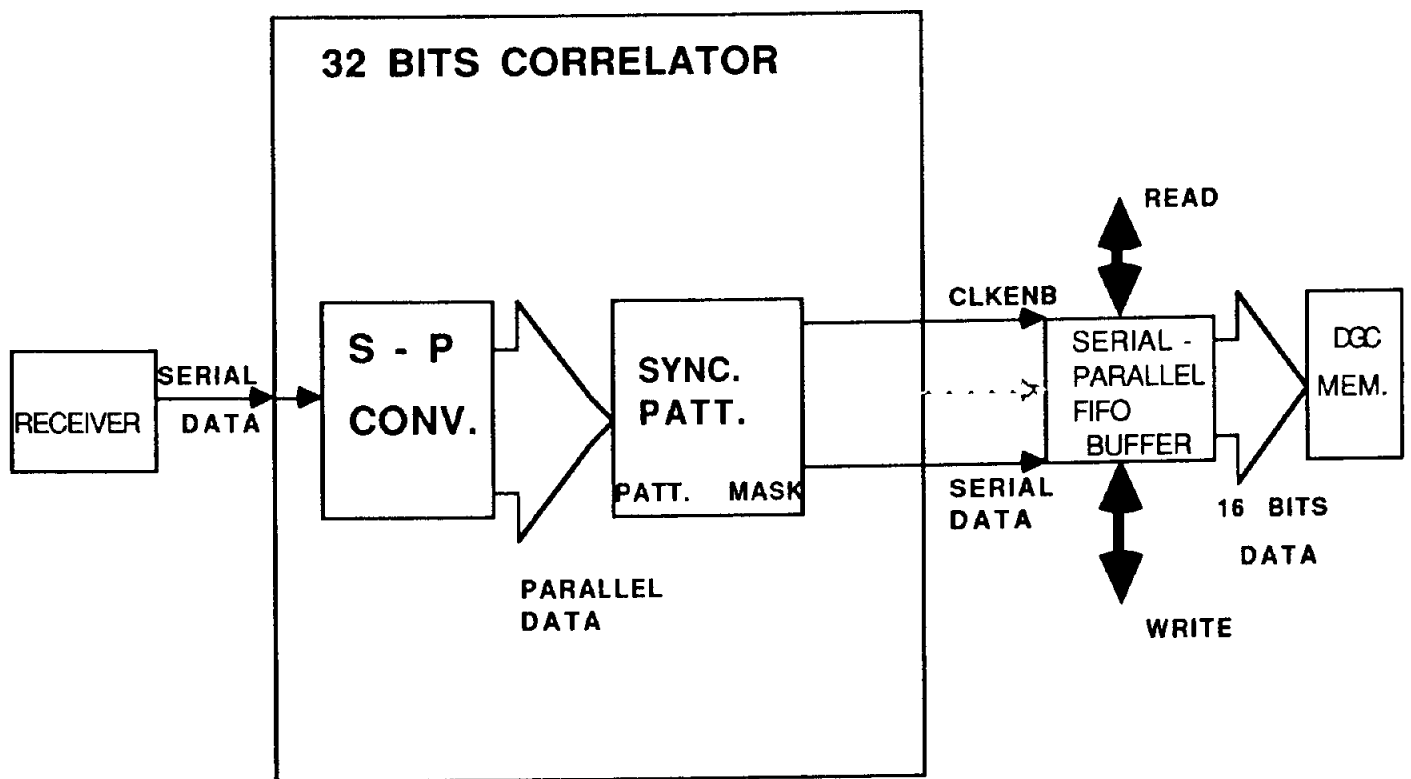
Carlos E. De Jesus Lafuente
University of Puerto Rico
Mayaguez Campus
Goddard Graduate Intern Program
Summer 1991

Objectives

- TO MODIFY A COMMUNICATION INTERFACE BOARD USING EPLD
- TO SIMULATE SELECTED PORTIONS OF THE SCHEMATICS USING ALTERA 1990 AND ALTERA 1991
- TO USE NEW FIFO'S WITH INTERNAL SERIAL-PARALLEL CONVERTERS IN THE MODIFIED CIB

SIGNIFICANCE

- THE CIB WILL ALLOW OUR BRANCH TO USE DATA GENERAL AND ROLM COMPUTER TO SIMULATE SPACECRAFT.**
- TO VALIDATE SPACE CRAFT COMPATIBILITY WITH NETWORK TRACKING AND COMMAND PROCEDURES.**
- TO REDUCE THE SIZE OF THE CIB LOGIC CIRCUIT AND MINIMIZE THE SIZE OF THE BUS.**
- TO MINIMIZE ERROR SOURCES SUCH AS NOISE AND TO AVOID WASTE OF TIME IN TROUBLE SHOOTING.**



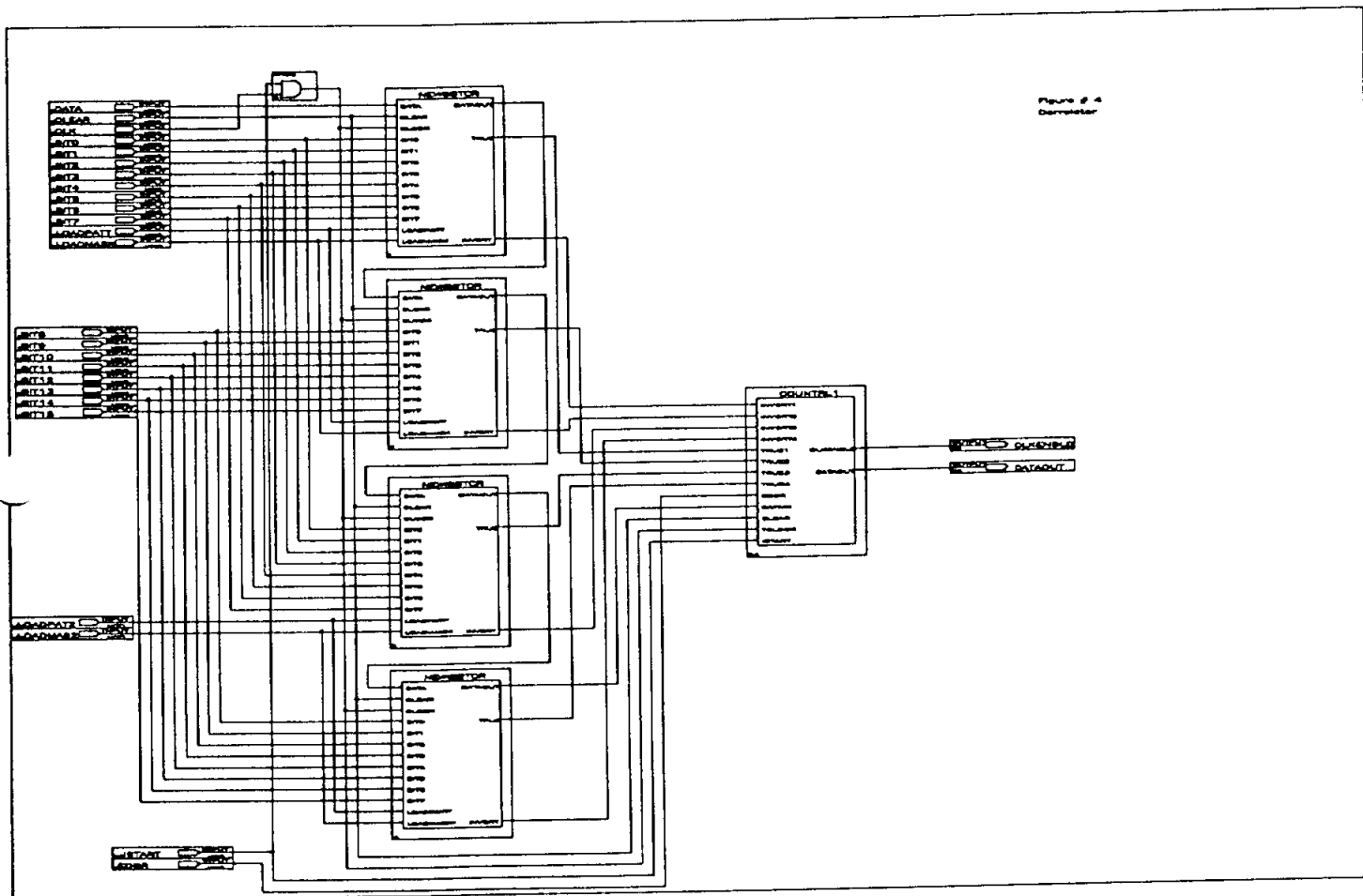


Fig. # 4 Correlator

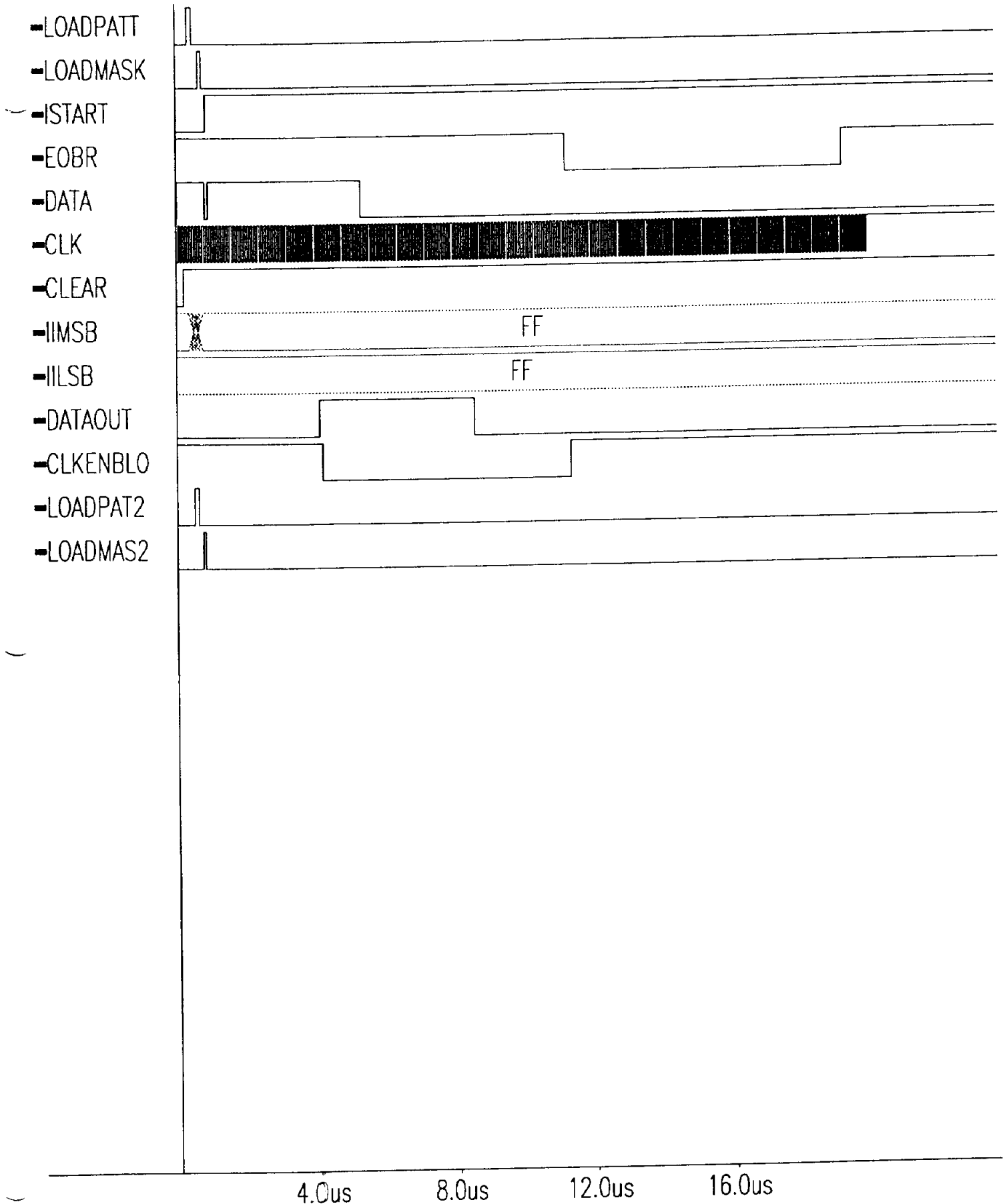
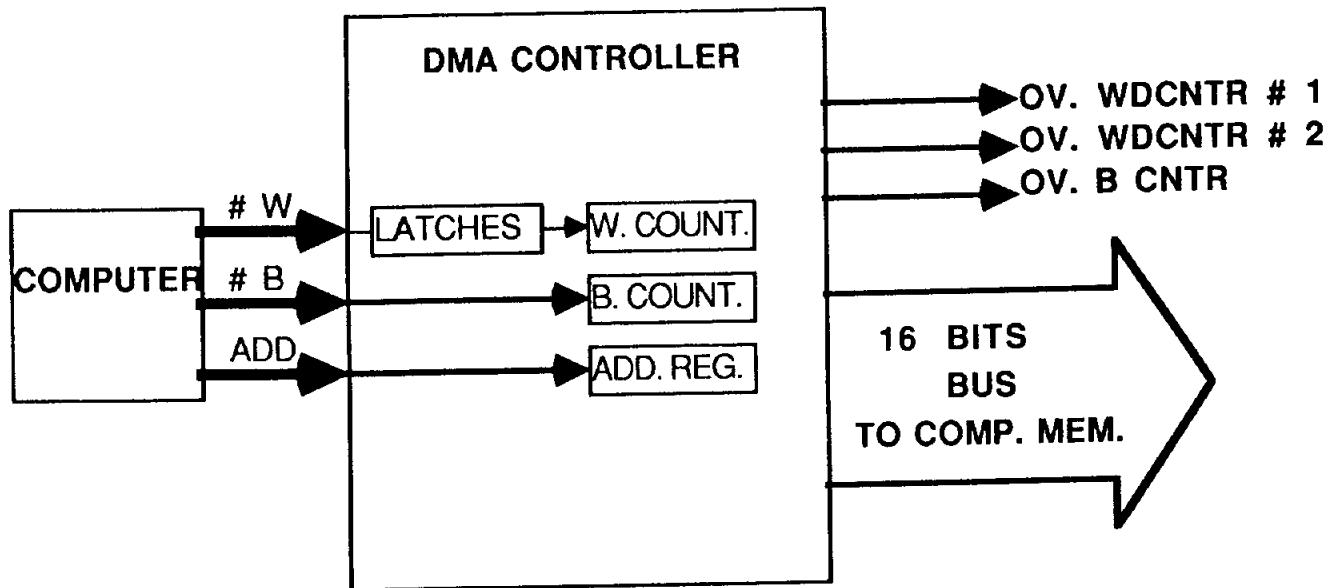


Fig. # 5 Correlators Simulation



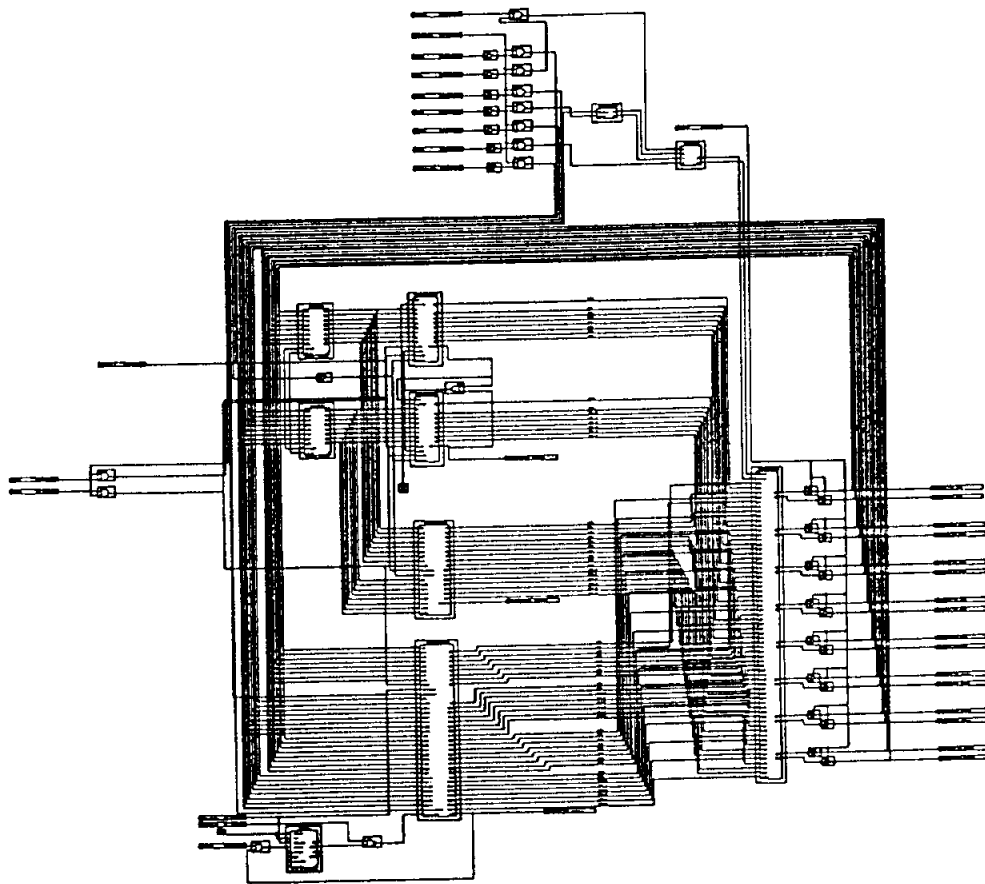


Fig. # 10 DMA Controller

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**Mathematical Analysis Techniques
For Modeling The
Space Network Activities**

Abstract submitted to the Graduate Internship Program
NASA-Space Technology Development
and Utilization Program

By
Lisa M. Foster, Doctoral Student
Department of Mathematics
Temple University
Philadelphia, PA 19122

The NCC is the operational manager of the Space Network (a facility consisting of personnel, communication links and computing equipment providing user communication services). The NCC provides utilities for:

- the scheduling support activities for the user community
- disseminates schedule information to the user as well as the other Space Network elements
- controls the services provided by the other Space Network elements
- maintains SN status and configuration information
- assures service performance
- coordinates fault isolation activities
- generates performance reports

The increasing complexity of the Space Network (i.e., ATDRSS, STGT) has created a need to evaluate its impact on the performance of the NCC. Currently these utilities are not available. However, using mathematical modeling techniques, they can be realized.

Modeling provides assistance to managers in the decision making process. It can be used to assess the impact of changes in requirements and design, identify potential bottlenecks and illustrate current operations and the effects of future enhancements. The two former items fall in the category of performance prediction, while the latter enables a person to assimilate and understand the operation of the NCC.

There are two ways to model problems. One way, called simulation, uses a computer to evaluate the system numerically over time. Simulation is a good tool for modeling detailed dynamics. Another method, called mathematical analysis (i.e. linear programming, queuing theory, etc...), is a good tool for optimization.

The NCC/SNC Modeling project has two objectives. The first objective of this effort is to develop a model of the Network Control Center which can be used for performance analysis and future expansion feasibility studies. The second objective is to provide a way of evaluating candidate designs and architectures for the emerging Space Network Control (SNC). The purpose of my research was to identify mathematical techniques for modeling activities within Code 530 . More specifically I chose to investigate the use of linear programming in conjunction with probability theory for modeling activities within Code 530.

In order to find a correlation between linear programming and probability theory, I first had to define a smaller scale problem. Since linear programming is a great modeling tool for optimization, I decided to model the Space Network resource allocation. The objective of this model was to optimize the Space Network (SN) resource allocation under nominal conditions and to compare current resource utilization against optimum resource allocation strategy without time dependency.

I wanted to show, by properly identifying the variables, that if there exists an optimal solution, then no matter how the boundary conditions change, the system should still be able to achieve optimal usage. I also wanted to examine the flexibility of the boundary conditions (by boundary conditions, I mean scheduling constraints).

By letting X_1, X_2, X_3, X_4 equal my resources (i.e. the channels found in two TDRS), the equation of the problem becomes:

$$\text{Optimize } Z = 4X_1 + 4X_2 + 2X_3 + 38X_4$$

where X_1 = SSA or KSA Forward

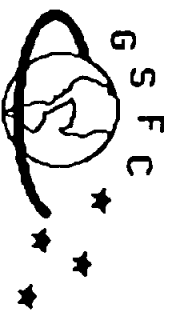
X_2 = SSA or KSA Return


X_3 = MA Forward

X_4 = MA Return

After examining several booklets to find the Space Network agreements for the various spacecraft, I discovered that approximately twenty percent of the available resources are being utilized. Thus illustrating that, in theory, there exists a surplus of resources. However, the problem is too dynamic for the use of linear programming only. Therefore this particular model cannot be used to accurately describe the Space Network system. Even after comparing current resource allocation with the agreement, I still found that approximately twenty to thirty five percent of the resources were still being utilized.


In conclusion, I could not find a direct correlation between the use of linear programming and probability theory. However, I'm not totally convinced linear programming and probability theory would not work with modeling activities within Code 530. Therefore during the two week hiatus before school starts, I will continue to work on that correlation.

MO&DS Directorate	NASA-Space Technology Development and Utilization Program	
Code 500		
<p style="text-align: center;">Mathematical Analysis Techniques For Modeling The Space Network Activities</p> <p style="text-align: center;">By Lisa M. Foster, Doctoral Student Department of Mathematics Temple University</p>		

MO&DS Directorate	Code 500	<div> NASA-Space Technology Development and Utilization Program </div> <div>  </div>

Agenda

- Objective
- Background
- Approach
- Small Scale Model
- Conclusion

MO&DS Directorate	Code 500	<div> NASA-Space Technology Development and Utilization Program </div> <div>  </div>
		<div> <h2>Objective</h2> </div> <div> <ul style="list-style-type: none"> • To explore and identify mathematical analysis techniques applicable for modeling Code 530 activities - - In particular, the use of linear programming </div>

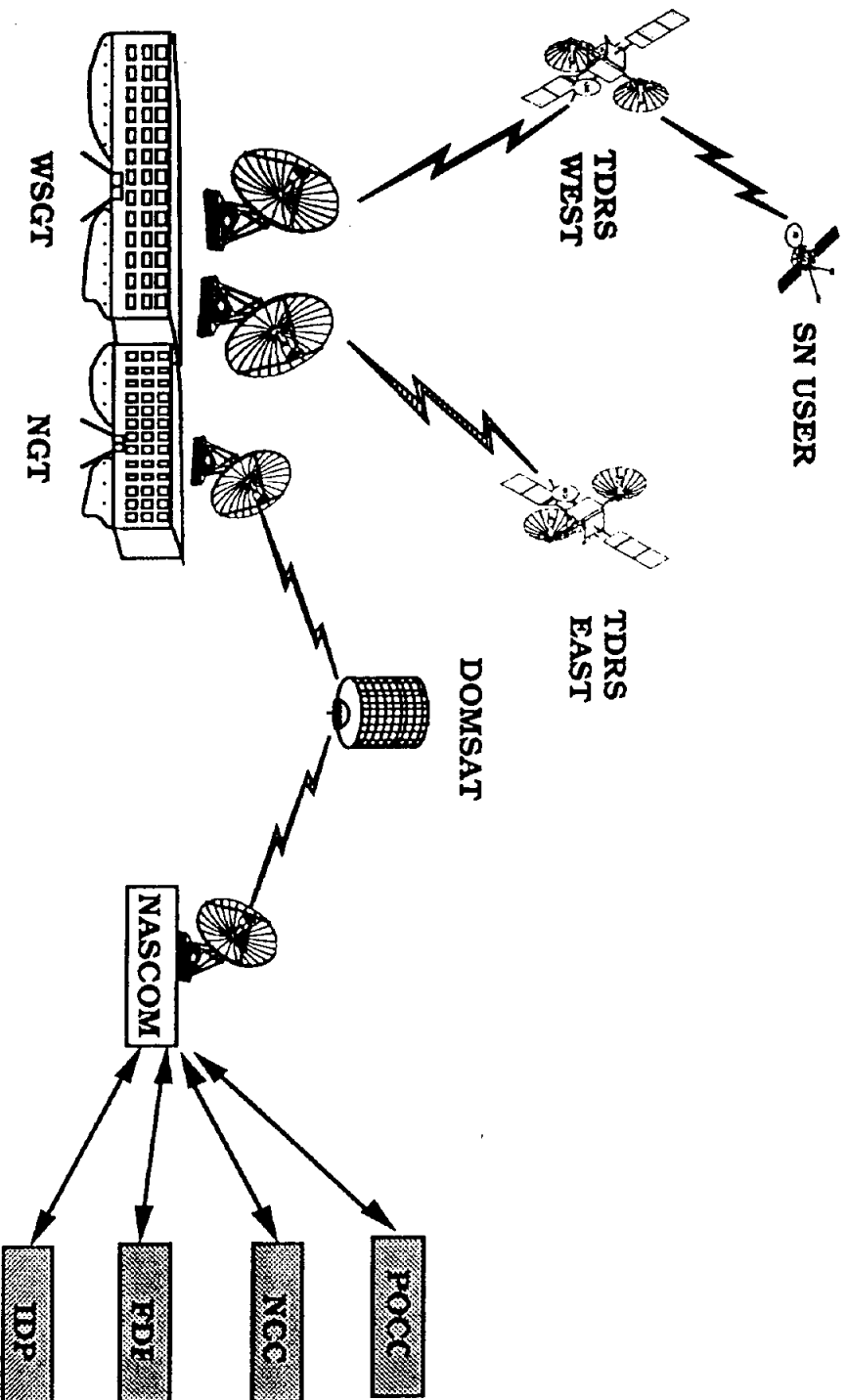
MO&DS
Directorate


Code 500

NASA-Space Technology Development and Utilization Program




Background



MO&DS Directorate	Code 500	<div> NASA-Space Technology Development and Utilization Program </div> <div>  </div>

Approach

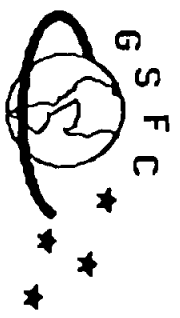
- Read several documents on the Network Control Center (NCC) and Tracking and Data Relay Satellite System (TDRSS) in order to understand the Space Network
- Read several papers on combining linear programming with probability theory
- Modeled small scale version of the system
- Identified variables
- Gathered data
- Compared actual usage versus theoretical usage

MO&DS Directorate	NASA-Space Technology Development and Utilization Program	
Code 500		
<div>Small Scale Model</div> <ul style="list-style-type: none">• Optimize Space Network (SN) resource allocation under nominal conditions• Compare current resource utilization against optimum resource allocation strategy without time dependency		

MO&DS
Directorate

Code 500

NASA-Space Technology Development
and Utilization Program



Small Scale Model Continued

$$Z = 4 X1 + 4 X2 + 4 X3 + 38 X4$$

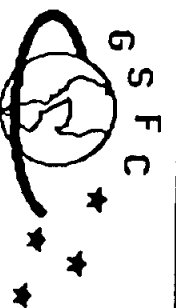
where

$$X1 = SSA / KSA \text{ Forward}$$

$$X2 = SSA / KSA \text{ Return}$$

$$X3 = MA \text{ Forward}$$

$$X4 = MA \text{ Return}$$




**MO&DS
Directorate**

**NASA-Space Technology Development
and Utilization Program**

Code 500

Small Scale Model Continued...

RESOURCES (2 TDRS)	AVAILABILITY	ACTUAL USAGE	AGREED UPON USAGE
SSA / KSA			
FWD	2,880	971.57	1,061.16
RTN	2,880	637.04	877.75
MA			
FWD	2,880	380.22	465.24
RTN	54,720	1,384.52	388.00
TOTAL			
FWD	5,760	1,351.79	1,526.40
RTN	57,600	2,021.56	1,265.75

MO&DS Directorate	NASA-Space Technology Development and Utilization Program	
Code 500		

Conclusion

- Could not find correlation between the problem and the use of linear programming in conjunction with probability theory
However, not totally convinced linear programming with probability theory would not work. Will continue to work on correlation
- In theory, enough resources exist to support the various spacecraft
That is not to say there exists no problem with the scheduling of the resources
Need to look into the scheduling process as well as other constraints for scheduling

Summer Projects

1) Analysis of Proposed Cost Estimating Course

- memo to B. Dixon

2) Writing and Editing "Introduction to Goddard Spacecraft Subsystem Cost Model"

- to be published as an RAO Research Note

3) Writing and Updating "Cost Profiles for GSFC Satellite Projects"

- to be published as an RAO Research Note

4) Analysis of ATDRSS Cost Estimates

- memo to P. Villone

)

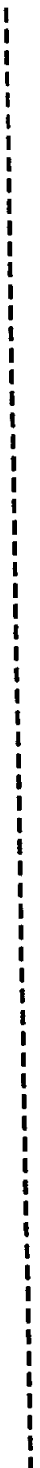
)

)

,

Conclusions continued

- initial estimate seems to include savings from a learning curve effect which may not ever be realized
- if valid, learning curve saves 26 months off schedule
- if invalid, learning curve yields an 18% overrun



As currently stated this project seems to be a risky propositions, at best

- Shape and smooth data by a Gauss-Newton non linear least squares fit and compare to average profile
 - Figure 3
 - problems
 - yearly peak to soon
 - either
 - or
 - initial years are ok and learning curve has shrunk rest of data points
- delta between the 2 cumulative curves is uniform with a peak of 18% = overrun if learning curve is wrong

TABLE 1

TDRSS PROJECT

TY	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL
LAUNCH NUMBER						LAUNCH	L2	L3		L4	L5		L6	L7		L8	L9		L10	
STARTUP A1-A5	0	30.0	30.0	10.0				30.0	30.0	10.0										70.0
STARTUP A6-A10	0																			70.0
REC S/C COM A-1	0	19.0	47.0	29.0	24.0	16.0														135.0
REC S/C COM A-2	0			42.0	36.0	32.3	11.2													121.5
REC S/C COM A-3	0				38.0	33.0	26.6	10.4												108.0
REC S/C COM A-4	0					22.0	36.0	27.0	16.3											101.3
REC S/C COM A-5	0						22.0	36.0	27.0	16.3										101.3
MONREC DESIGN A1-A5	0	38.0	24.0																	62.0
REC S/C COMA FC A1	0	6.3	15.5	9.6	7.9	5.3														44.6
REC S/C COMA FC A2	0			13.9	11.9	10.7	3.7													40.2
REC S/C COMA FC A3	0				12.5	10.9	8.8	3.4												35.6
REC S/C COMA FC A4	0					7.3	11.9	8.9	5.4											33.5
REC S/C COMA FC A5	0						7.3	11.9	8.9	5.4										33.5
SUSTAINING EXPENSE	0					20.0	20.0		15.8	25.0		10.0								90.8
IUS-MONREC	0	12.0	12.0																	24.0
IUS-REC	0		3.0	9.0	9.0	6.0	9.0	9.0	6.0	9.0	12.0	9.0								81.0
LAUNCH SUPPORT	0					3.0		3.0	3.0	3.0		3.0								15.0
STORAGE	0						0.1	0.1	0.1	0.1	0.1	0.1								0.1
POST STORAGE 1ST	0										6.0									6.0
TOTAL	0.0	105.3	131.5	113.5	139.3	166.5	156.6	139.7	112.5	68.8	18.1	22.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1173.9
CUMULATIVE TOTAL	0.0	105.3	236.8	350.3	489.6	656.1	812.7	952.4	1064.9	1133.7	1151.8	1173.9	1173.9	1173.9	1173.9	1173.9	1173.9	1173.9	1173.9	1173.9

1173.9

FIGURE 2

TDRSS COST ESTIMATES

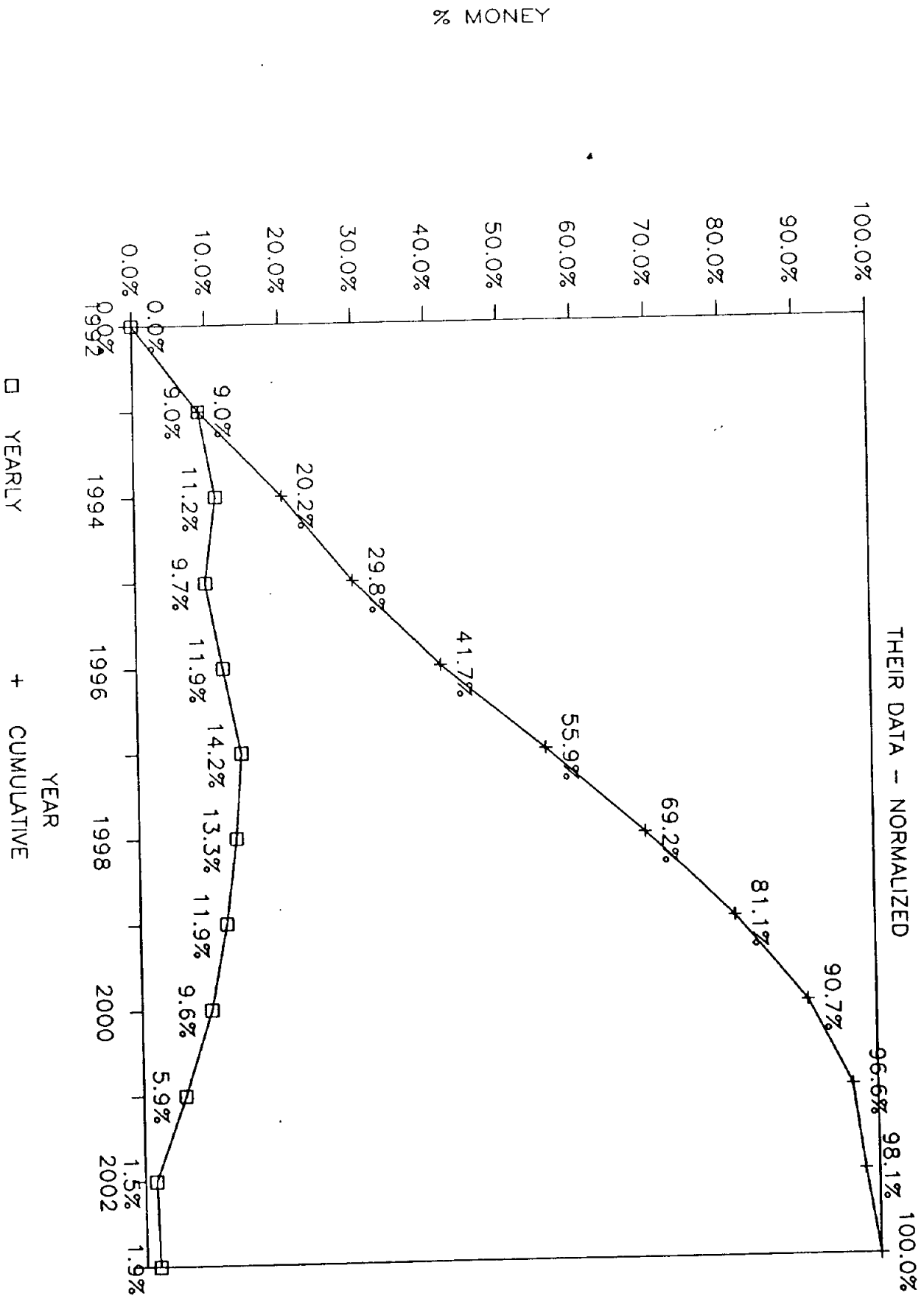
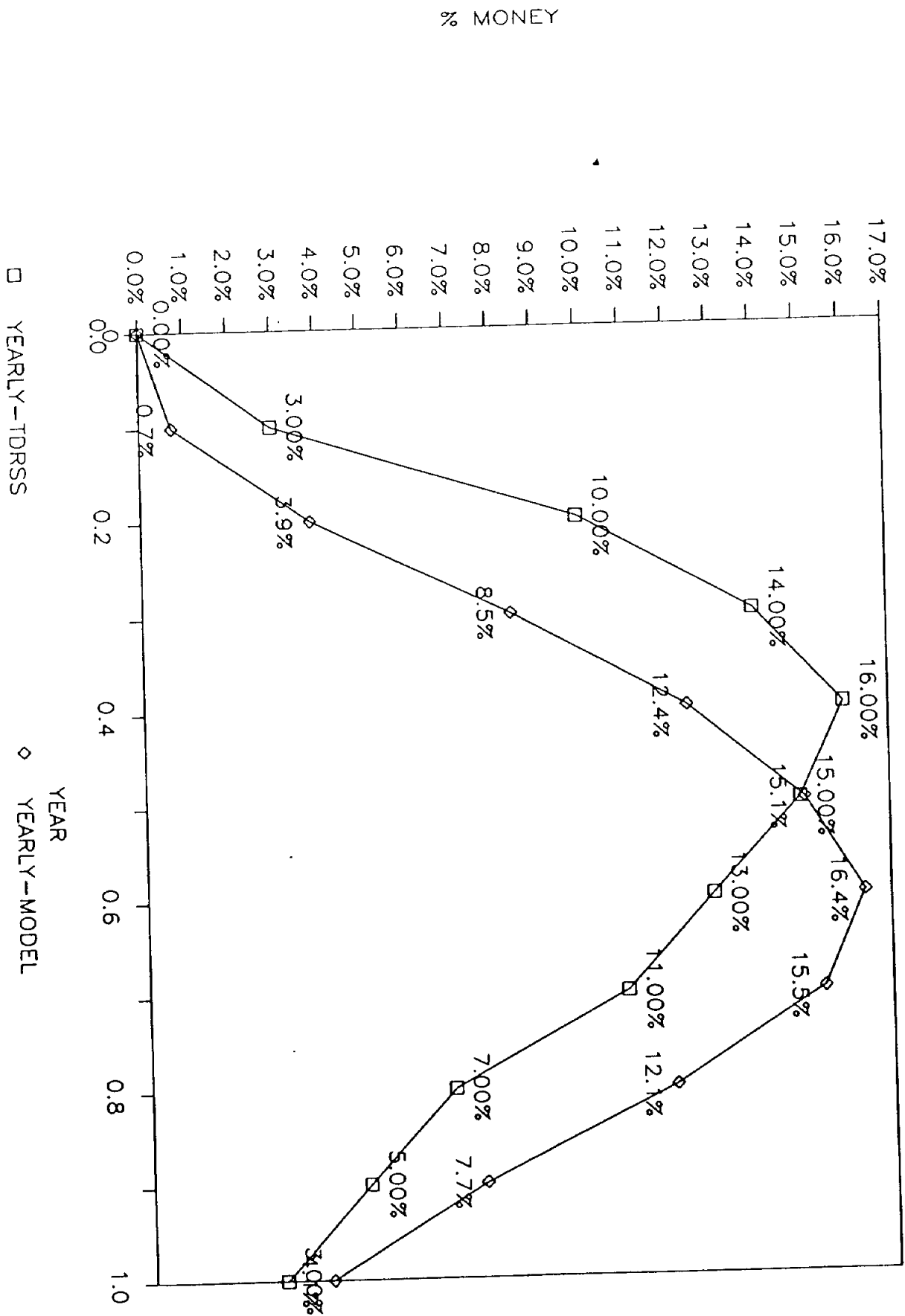


FIGURE 4
TDRSS/MODEL COMPARISONS



73-75
10-56-
p. 19
TM 73N92-23965

USE OF THE MAXIMUM ENTROPY METHOD TO RETRIEVE
THE VERTICAL ATMOSPHERIC OZONE PROFILE AND PREDICT
ATMOSPHERIC OZONE CONTENT

A report submitted to the Graduate Intern Program
NASA/Goddard Space Flight Center - Space Technology
Development Program

by

B. Curtis Turner, Graduate Student
Department of Physics
Temple University
Philadelphia, PA 19122
(215) 787-7656

B. Curtis Turner

August 7, 1991

*Graphs and results are
proprietary material*

Subscribed and sworn to before me in my presence,
this 3rd day of July, 1991, a Notary Public
in and for the State of Maryland.

[Signature]
Notary Public

My Commission Expires August 1, 1993

INTRODUCTION

- * In 1934, Gotz and Dobson made a fundamental study on the problems associated with inversion of radiance measurements for atmospheric ozone profiles.
- * First method for vertical atmospheric ozone distribution from satellite measurements presented by Singer and Wentworth.
- * The current National Space Science Data Center algorithm for BUV (Nimbus-4) and SBUV (Nimbus-7) archives is based primarily on the work of C.D. Rodgers.
- * This method formulated in terms error covariance matrices, is associated with both direct measurements, apriori first guess profiles, and a weighting function matrix.

STATEMENT OF THE PROBLEM

Profile Retrieval

Power Spectrum

1. Profile retrieval: Achieved by Inversion of Radiative Transfer Equations.

$$\int K(x) x dx = y \quad (\text{Fredholm Integral/1st kind})$$

K = Kernel (Planck Radiation Law/Maxwell Equations)
x = unknown profile
y = given data set of radiance values

* To numerically solve: K(x) assumed independent of x.
Then the equation is written in a linearized form:

$$y = Ax + \eta$$

A = weighting function matrix
 η = noise

* Standard Approach

- Ignore η
- Find A^{-1}
- Solve $x = A^{-1}y$

* Problems:

1. The A matrix is near singular
2. Number of Unknowns in the profile exceeds the number of data points (The Ill-Posed Problem) Therefore, the solution may not be unique.
3. Even if a unique solution exists, η may cause the solution to be ill-conditioned.

MAXIMUM ENTROPY SOLUTION

* Since the number of unknowns exceeds the number of data points, probability theory is needed.

* Introduce Maximum Entropy formalism which induces an unknown probability distribution from partial data.

* Maximize the information measure subject to the following constraints:

-- Sum of the probabilities is 1.

-- The data, given as averages, is written in the form of expectation values.

* Solution: An exponential probability distribution.

$$p_i = \exp\left[-\sum \lambda_j A_{ij}\right] / Z(\lambda_j)$$

where λ_j = Lagrange multipliers, and
 $Z(\lambda_j)$ = Partition function.

2. Power spectral estimation for a time series of TOMS data.

In 1967 Burg introduced his Maximum Entropy Method (MEM) for power spectral estimation

$$P(f) = \frac{(P_N + 1)/f_N}{N \left| 1 + \sum_{n=1}^N a_{Nn} \exp[-2\pi i f n \Delta t] \right|^2}$$

- P_N is the prediction filter error power
- a_{Nn} are the filter coefficients
- f_N is the Nyquist/sampling frequency

The coefficients are obtained from the Yule-Walker equations:

$$\begin{pmatrix} \phi_0 & \phi_1 & \dots & \phi_N \\ \phi_1 & \phi_0 & \dots & \phi_{N-1} \\ \vdots & \vdots & \ddots & \vdots \\ \phi_N & \phi_{N-1} & \dots & \phi_0 \end{pmatrix} \begin{pmatrix} 1 \\ a_{N0} \\ \vdots \\ a_{NN} \end{pmatrix} = \begin{pmatrix} P_{N+1} \\ 0 \\ \vdots \\ 0 \end{pmatrix}$$

- ϕ_N are the time-correlations functions of the data.
- Length of the filter, N , has to be determined.

RESULTS

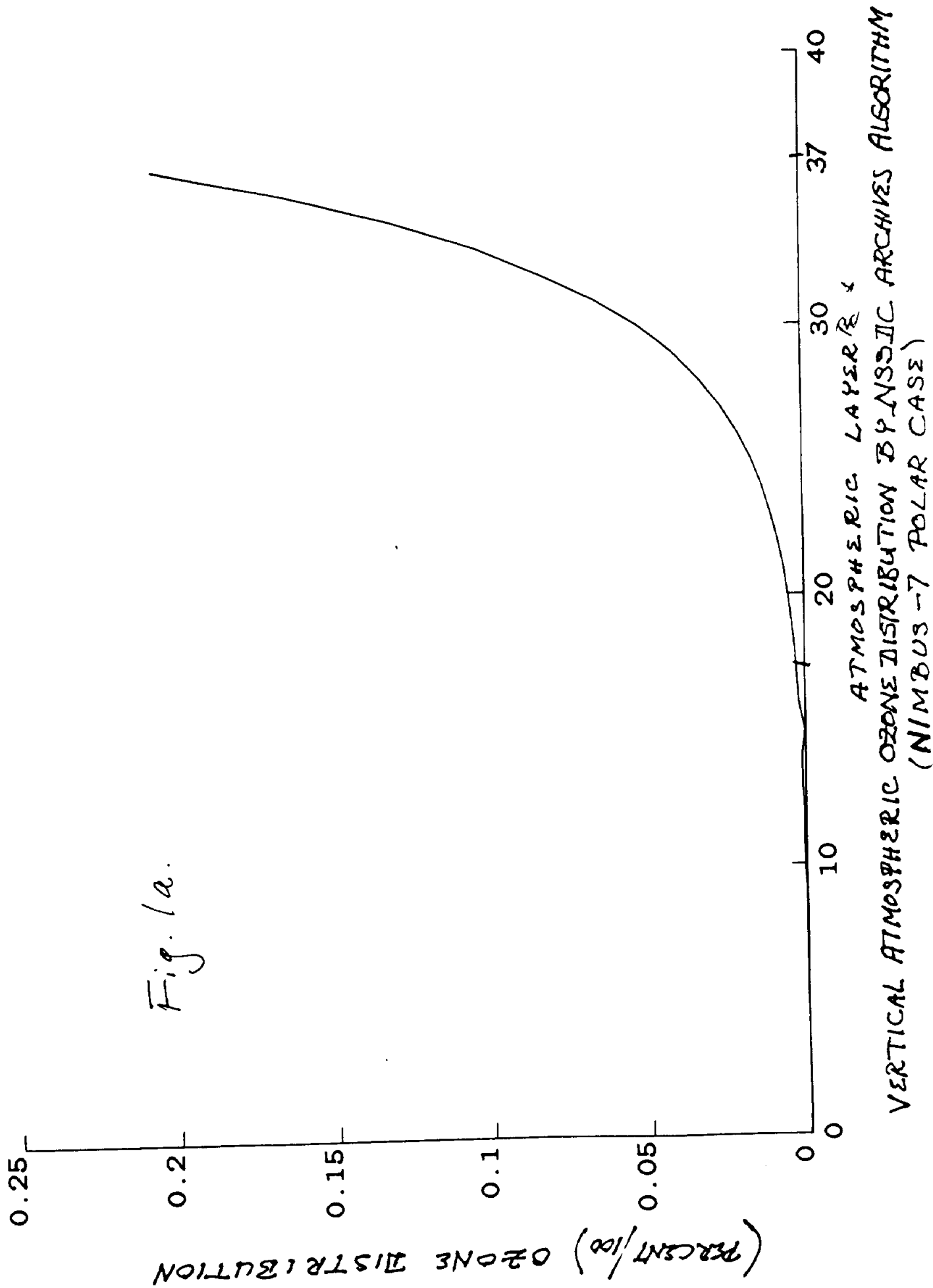
The cases depicted in the Figures are preliminary and being refined for publication in two separate journals of the joint American and European physical societies. Figures 1a and 1b show the case of the ozone profile retrieval as done by then National Space Science Data Center and the Maximum Entropy Method respectively. The latter shows a clear depletion of ozone for data taken by Nimbus-7 in the antarctic region. Likewise, in figures 2a and 2b, for a mid-latitude sampling, the Maximum Entropy shows a more realistic ozone depletion picture.

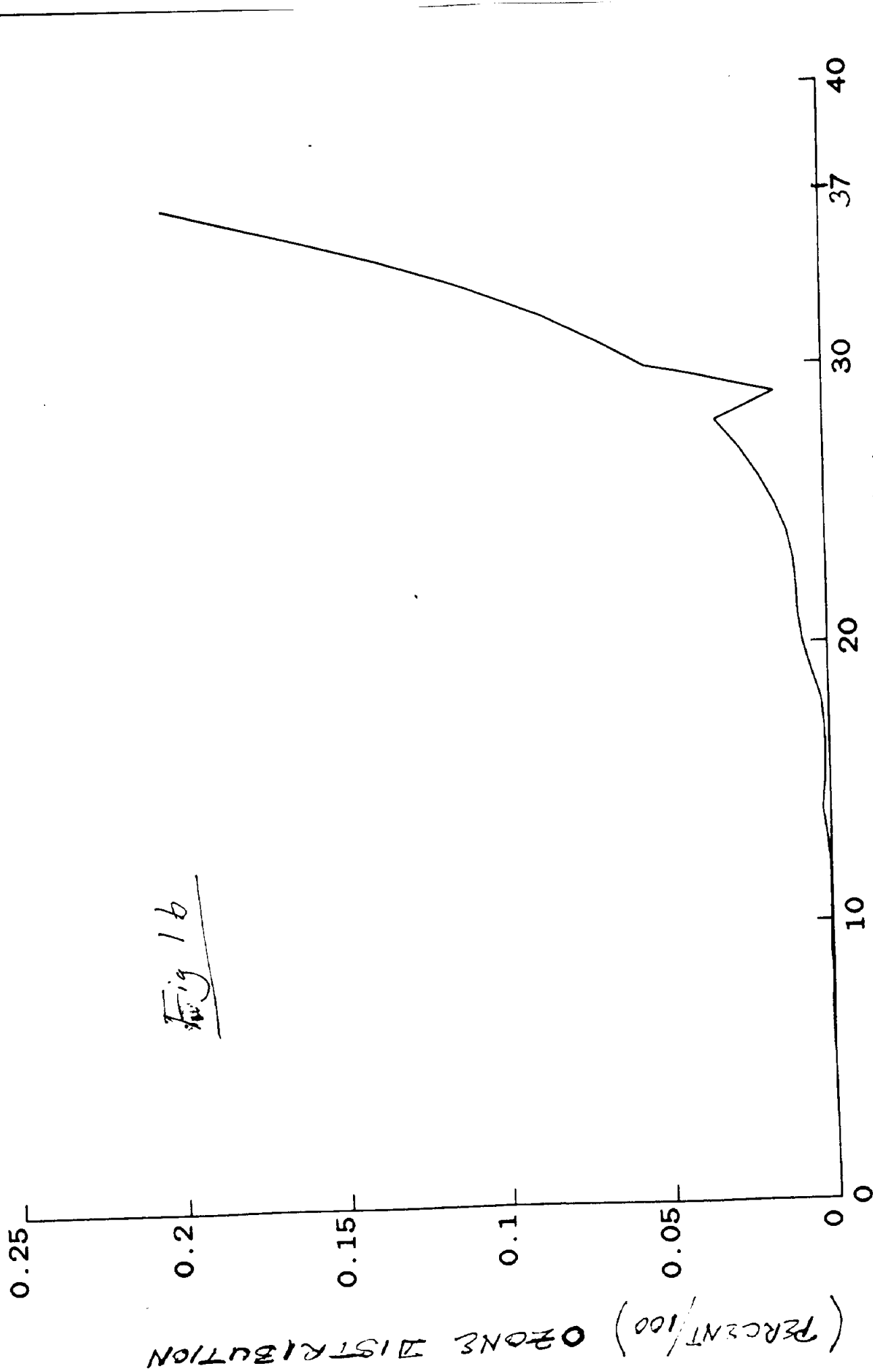
Figures 3a, 3b and 3c involve the time-series and Maximum Entropy power spectra for the city of Hyderabad, India for the active solar year 1979. The randomness and periodicities evident in the TOMS time series is clearly confirmed in Figure 3b. More important, the three expected abnormalities, namely the 18 day solar cycle, the mid-year peak due to the change of equinoxes and the annual cycle of the motion of the ecliptic are present. This is strong evidence for the validity of this approach. The other cycles are being studied with perhaps a correlation of the 210 day cycle with the half period of the Chandler wobble as a possibility. The 80 day sample was performed as a check of both the stationarity of the series and the authenticity of the 365 spectrum cycles (Fig 3c). This confirms the origin of the physical processes governing the spectral periodicities as arising very early within the solar year!

Figures 4a and 4b are the TOMS time series and full Maximum Entropy spectrum for Hyderabad for the less active 1980 year. A slight shift in both the dynamic range and frequency again clearly show that the series are not quite stationary from year-to-year, but the major cycles remain. In all cases, a comparative FFT Spectrum could resolve no more than the mid-year peak and was therefore abandoned.

The remaining cases show both the time series and resulting full and partial sample spectra New York City (41° lat) and SYOWA (Japanese) antarctic station (-70° lat). The New York data shows a much larger random spread than Hyderabad and this resulted in a larger number of multiple frequencies in the spectrum. A greater number of major cycles are present as are some of those found in Hyderabad data including the speculative half period Chandler wobble.

The SYOWA spectrum was calculated for the cases of 134 days (up to the Sun gap), and 365 days (including the gap) and again, a short sample of 80 days. This was done in part to study effects such as the quasi-bilinear-oscillation (QBO). More work needs to be done at this point to estimate correctly the secular trends in total ozone.





ATMOSPHERIC LAYER
VERTICAL ATMOSPHERIC OZONE DISTRIBUTION BY MAXIMUM ENTROPY INVERSION
(NIMBUS-7 POLAR CASE)

SET4UNK.DIS DATA: N = 20 08-06-90 09:00:27

DISTRIBUTION BY
NSSOC ALGORITHM

OZONE DISTRIBUTION

0.20

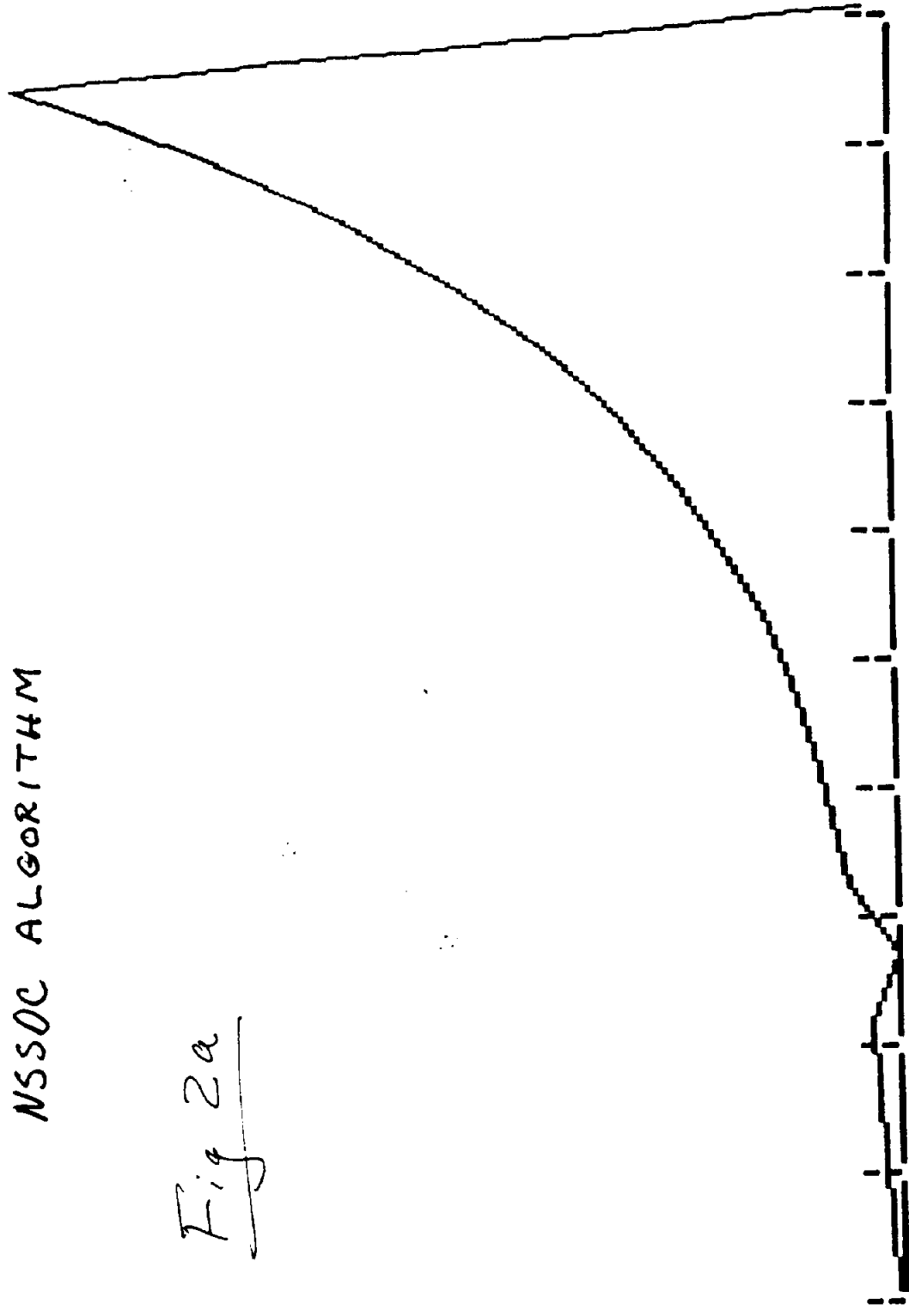
0.15

0.10

0.05

0.00

Fig 2a



ATMOSPHERIC LAYER

set4con.dis DATA: N = 19 08-11-1990 08:54:12

DISTRIBUTION BY
MAXIMUM ENTROPY METHOD

OZONE DISTRIBUTION

0.20

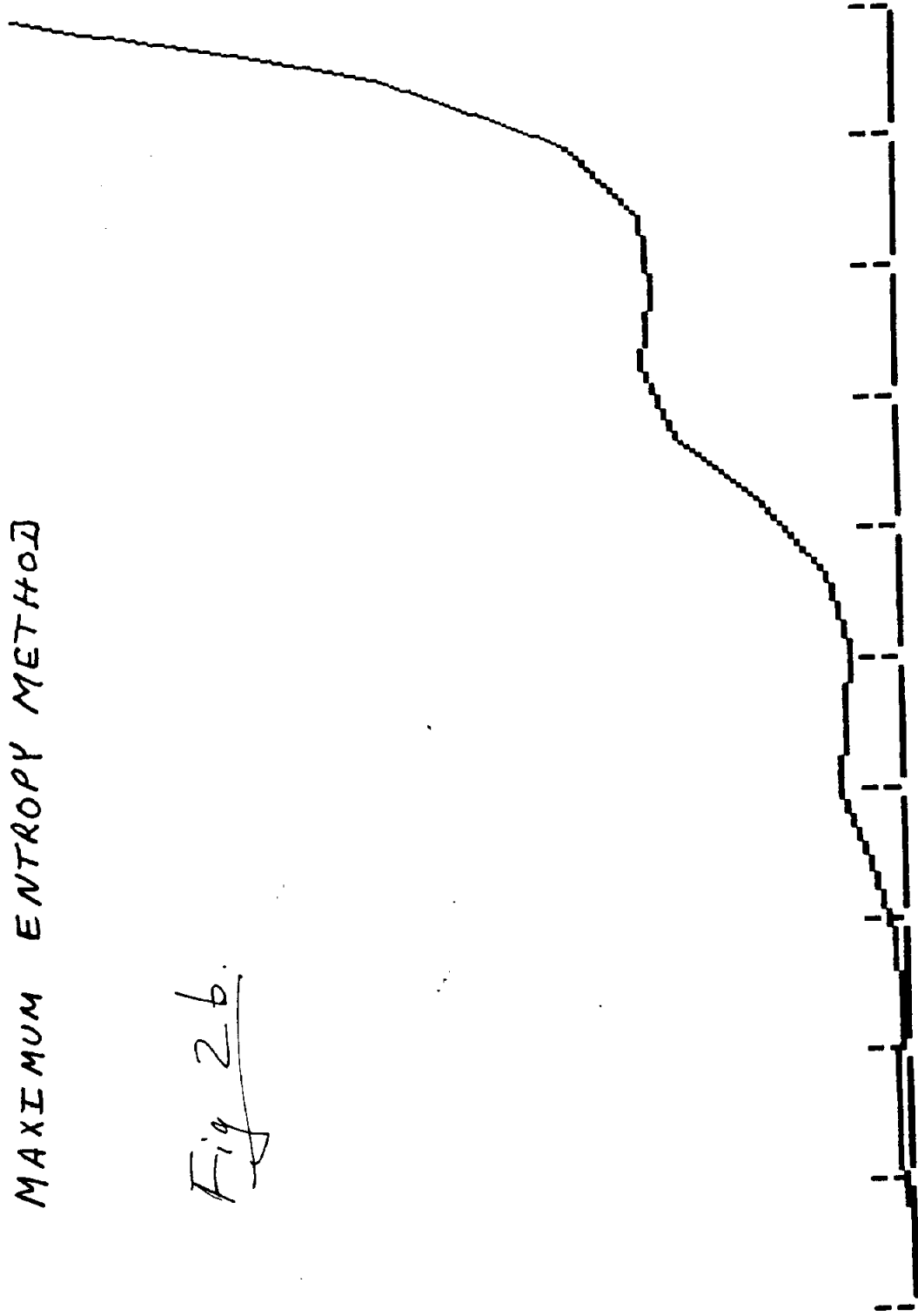
0.15

0.10

0.05

0.00

Fig 2b.

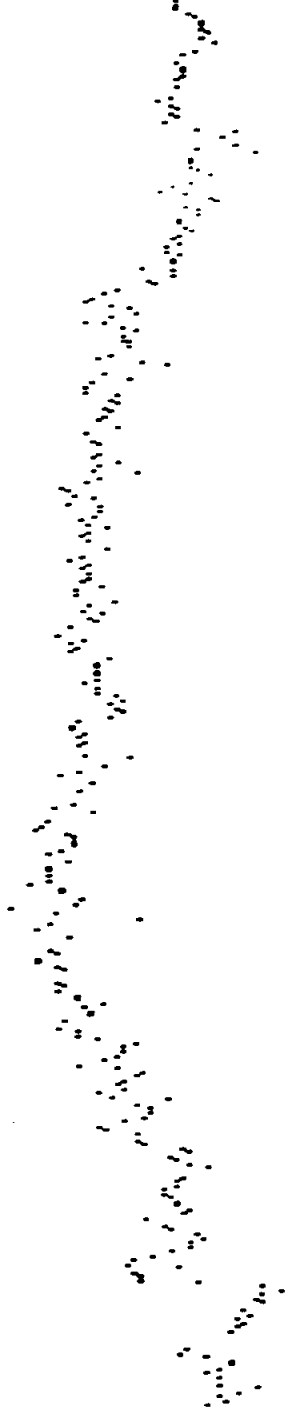


ATMOSPHERIC LAYER

TOZ.DAT DATA: N = 366 01-01-1980 05:47:51

Fig 3a

313



235

157

78

0

TOMS Hyderabad, India - 1979

179280

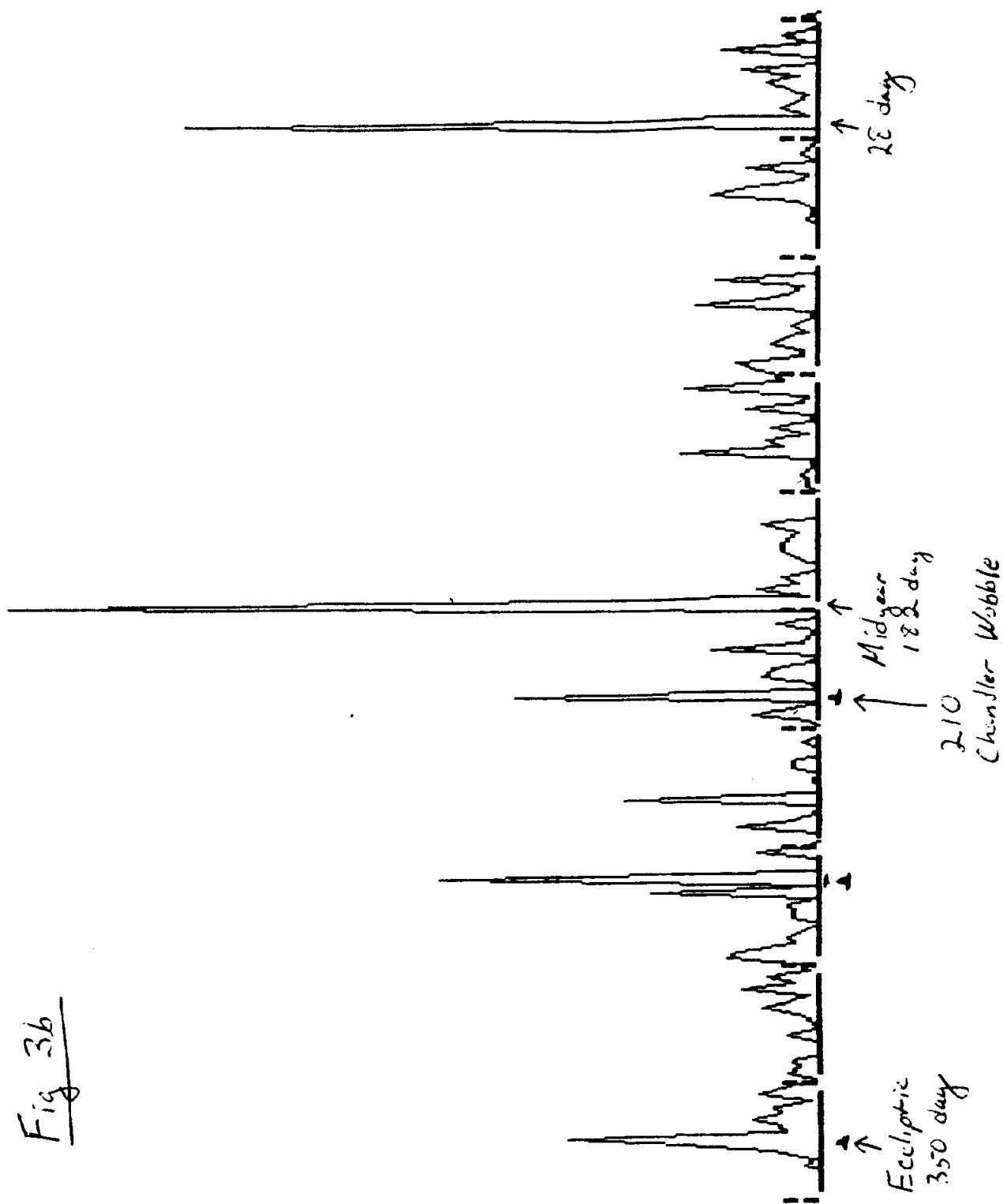
Fig 3b

134460

89640

44820

0



Max Ent Spectrum for Fig 3a

7958040.dat DATA: N = 182 01-01-1980 03:49:00
(N = 80 days)

Fig 3c

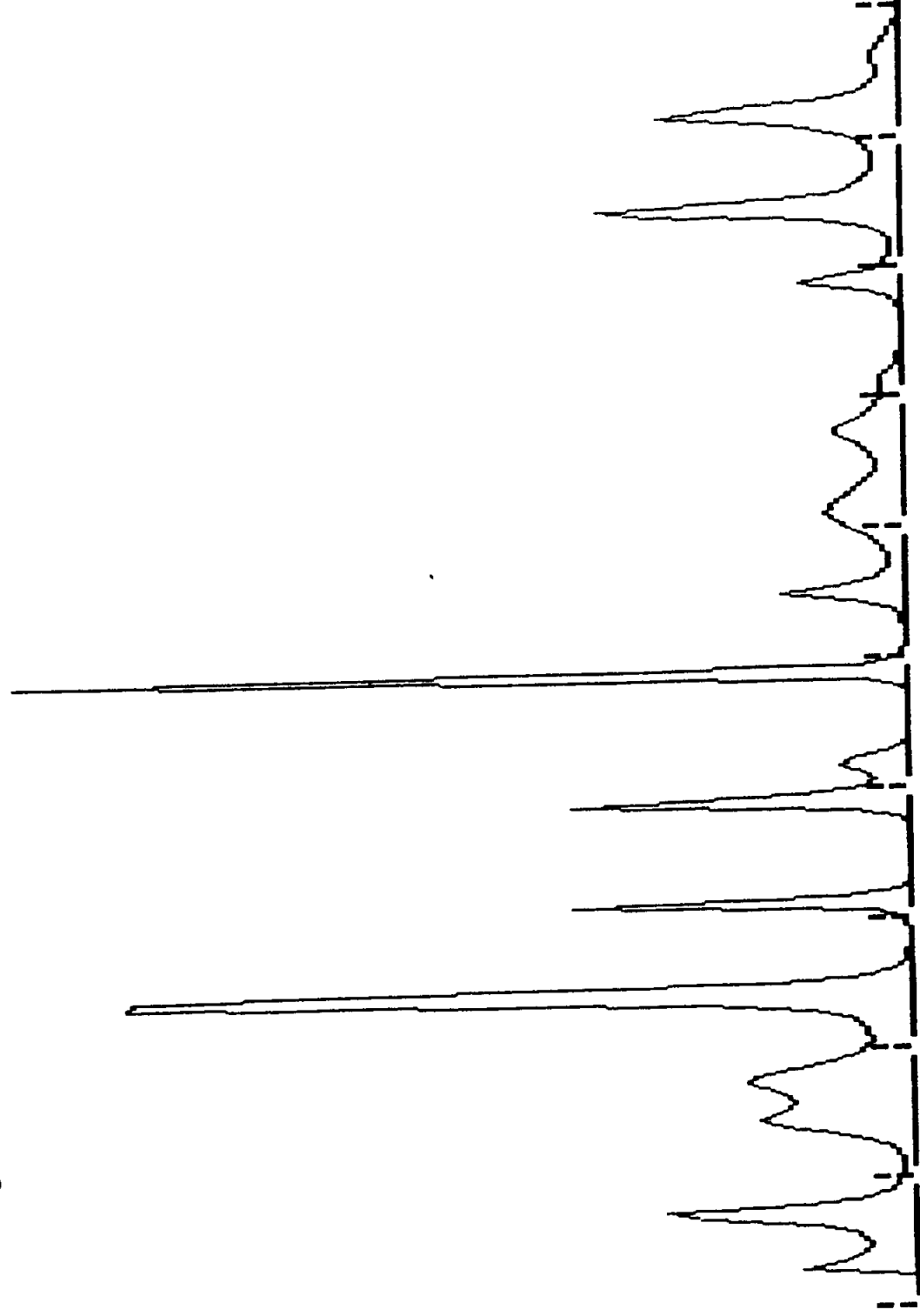
84590

63442

42295

21147

0

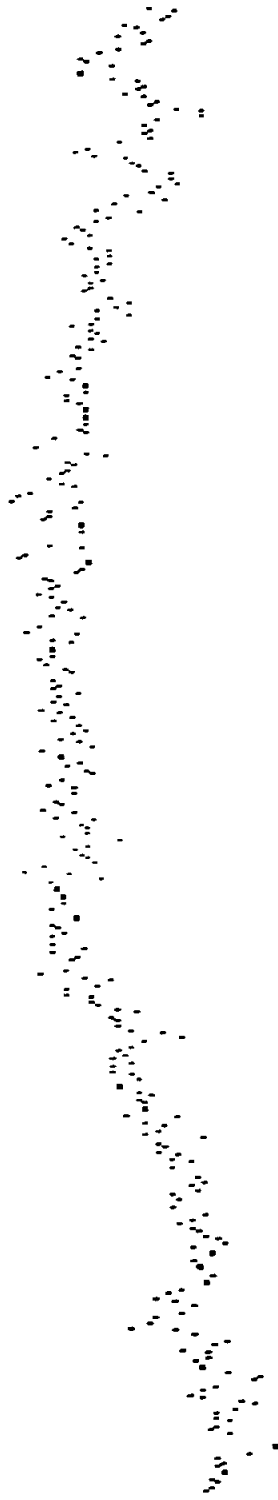


80 day Max Ent Spectrum for Fig 3a

TO_00.DAT DATA: N = 366 01-01-1980 6:15:08

Fig 4a

301



226

151

75

0

TOMS for Hyderabad, India - 1980

80spc170.dat DATA: N = 182 01-01-980 05:09:07

Fig 4b

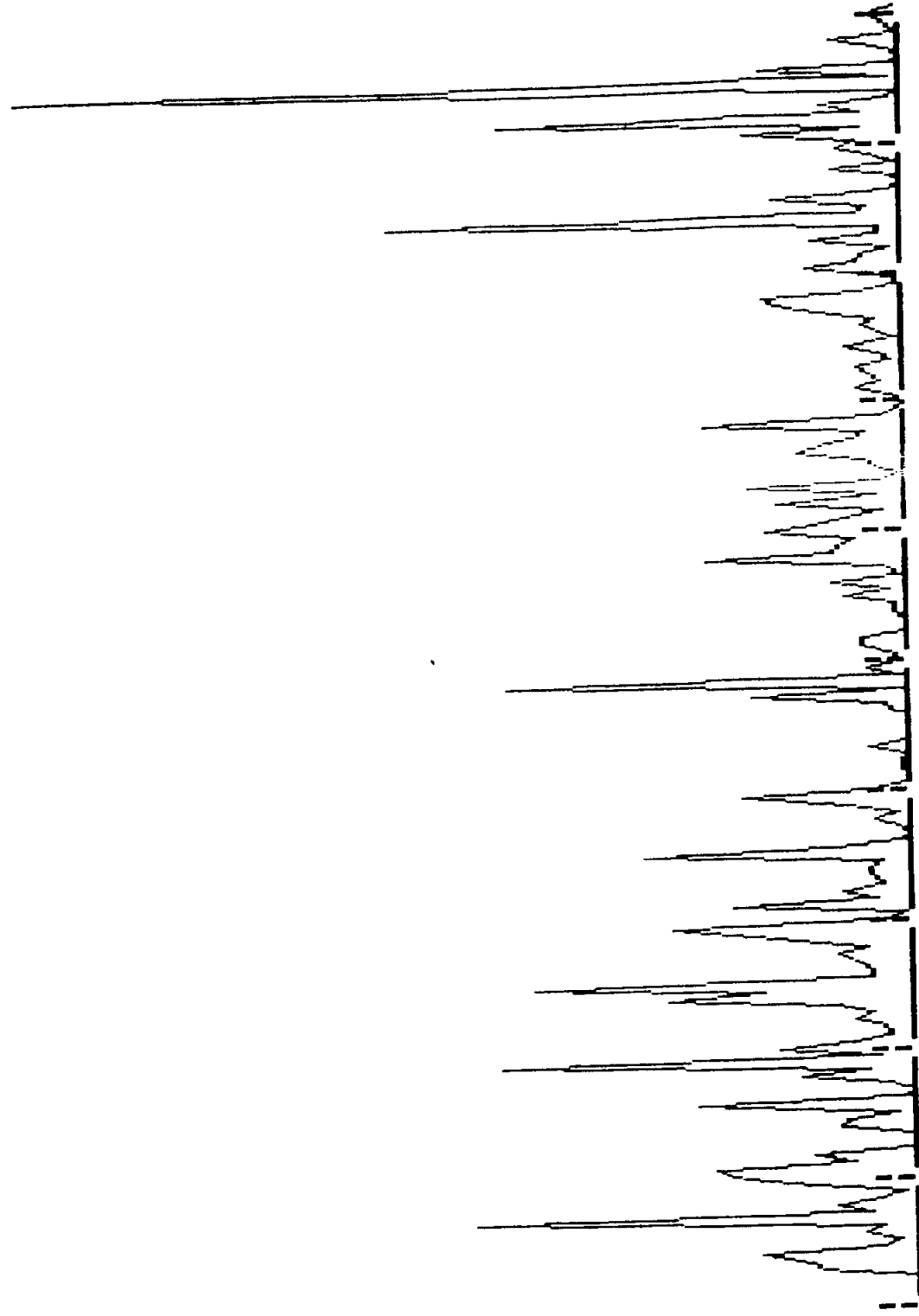
48800

36600

24400

12200

0



Max Ent Spectrum for Fig 4a

SNEWYORK.DAT DATA: N = 371 01-1-1980 04:42:16

Fig 5a

497

373

249

124

0

TOMS - New York City - 1979

New York City 1979 $K = 178$

Fig 5b

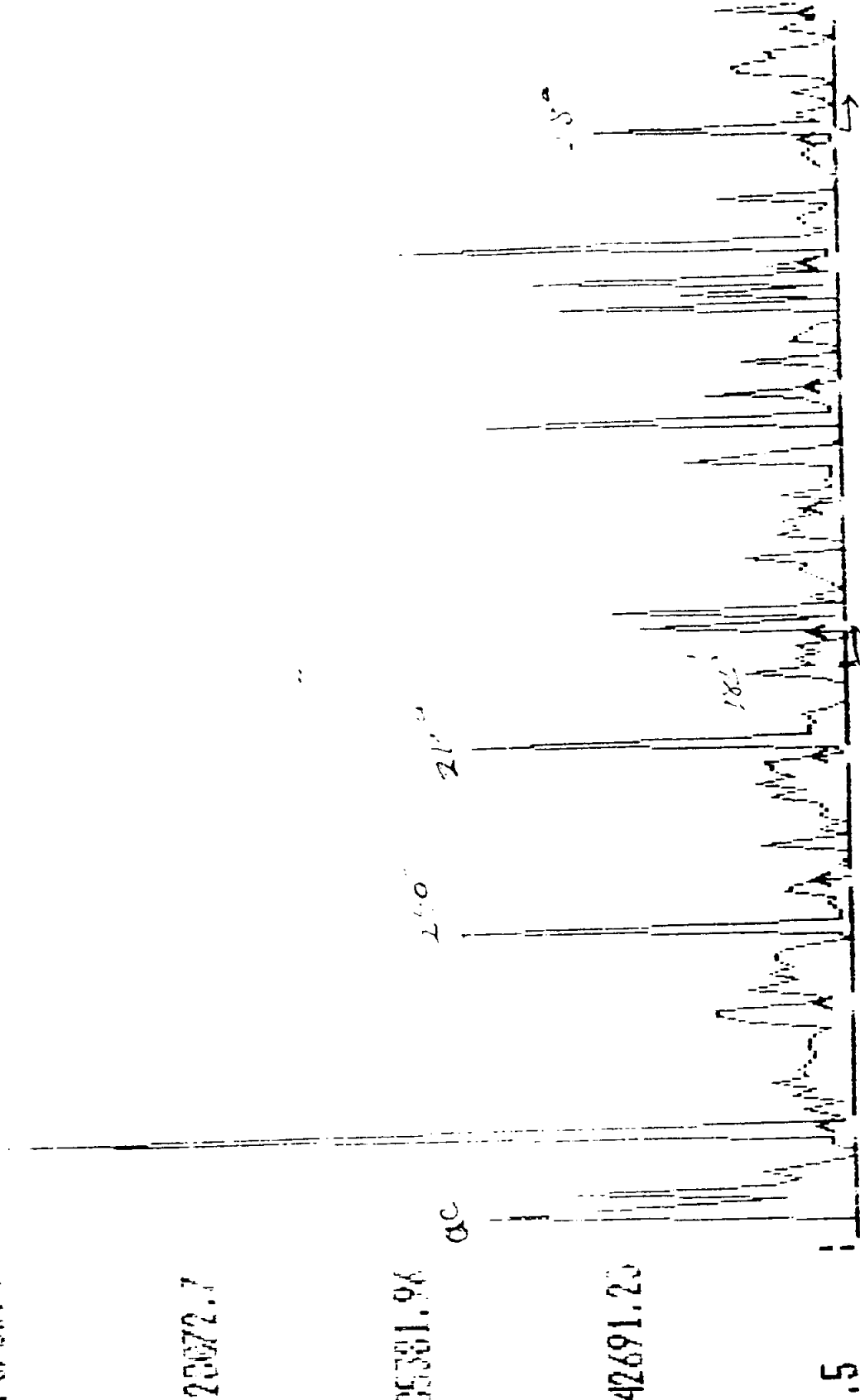
176763.4

123672.7

95381.96

ac

42691.23



Max Ent Spectrum for Fig 5a

503

Fig 64

377

252

126

0

TOMS- Syowa - 1979 - Japanese Antarctic Station

79syyp90.dat DATA: N = 182 01-6-1980 00:21:14

134d

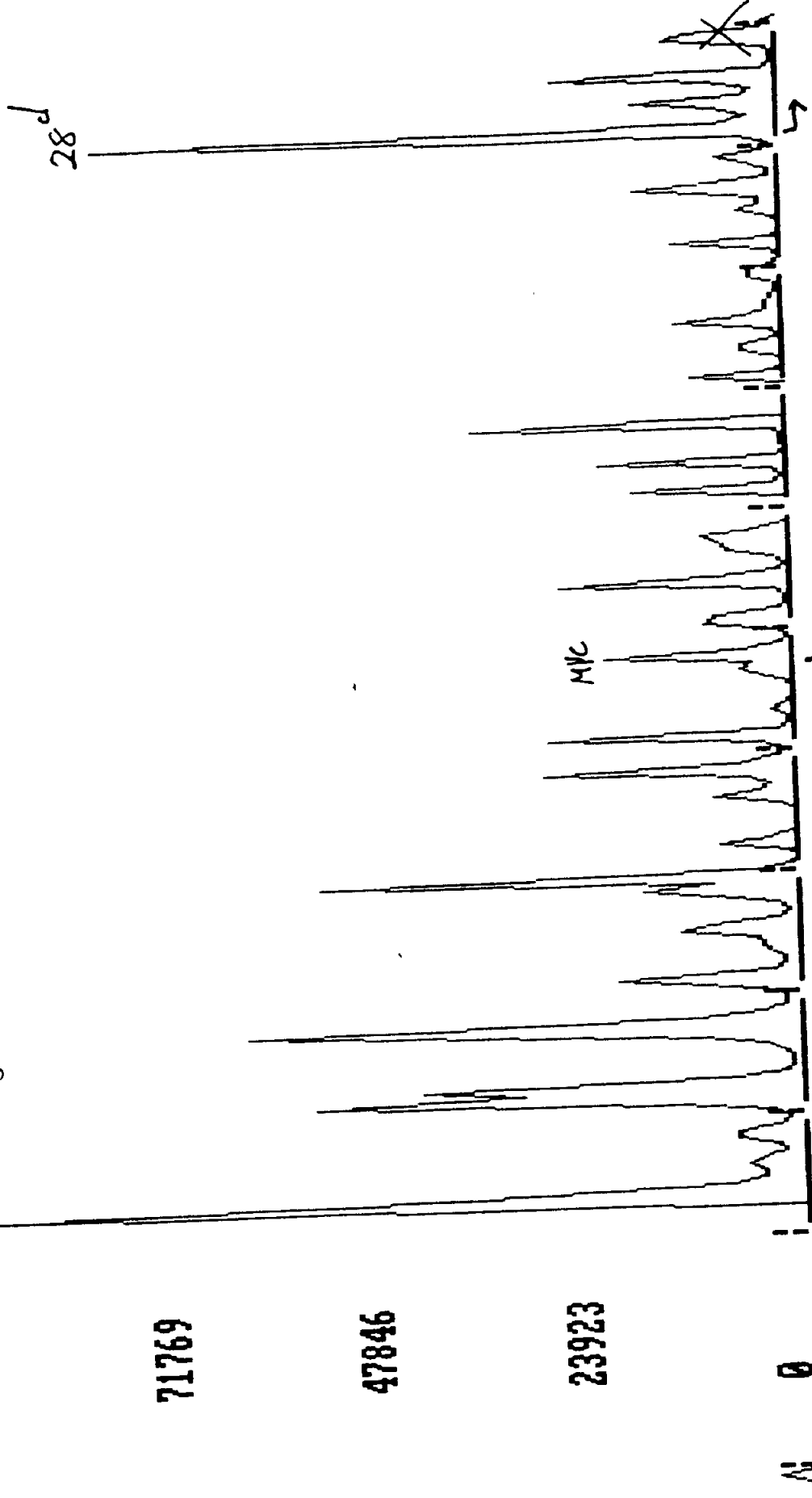
95692 AC Fig 66

71769

47846

23923

0



Max Ent Spectrum for 134 day Sample from Fig 66

..3Y170.DAT DATA: N = 182 01-01-19(01:20:21

SYOMA (JAPANESE ANTARCTIC STATION)
(365^d)

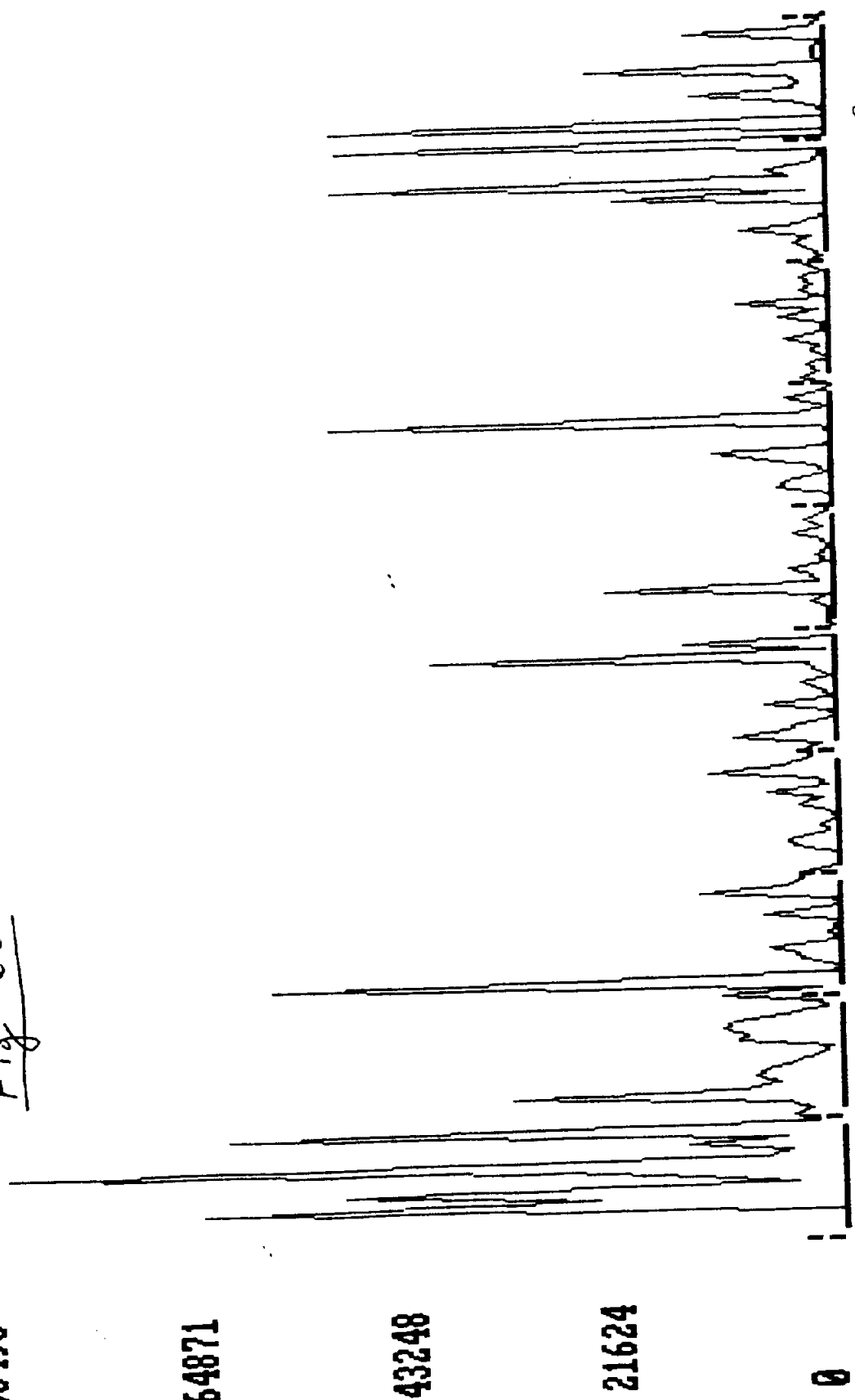
86495

64871

43248

21624

Fig 6c



Max Ent Spectrum for a full 365 day sample from Fig 6a

WHAT DID I DO FOR THE SUMMER OF 1991?

Aquair L. Walton
P.O. Box 121552
Nashville, Tn 37212

I

PLAYED

ASTROPHYSICIST

AT

Goddard Space Flight Center!

ACKNOWLEDGMENTS

My life has taken several turns, each of which contributed to my success. The first turns in my life were given to me by my parents Henry and Grace Walton. I thank them first because without them none what I have accomplished could have been possible.

The most recent turn in my life came thru my academic work at Fisk University under the auspices of the faculty members Dr. Silberman, Dr. Morgan, Dr. Burger, Dr. Henderson and Dr. Springer, the chairman of the physics department.

I was propelled into astrophysics by the enthusiasm, knowledge, and imagination of my advisor Dr. Charles McGruder. His unfailing spirit for life, different experiences and excitement about physics and the objects in the sky caused me to turn my eyes and dreams towards the heavens.

Dr. McGruder and I both are able to do physics at Fisk University because we truly stand upon the shoulders of men that have foraged a wide path for us to follow. My experience at Goddard Space Flight Center as well as my graduate work at Fisk University was made possible by the man to whom I dedicate this work. He is the man behind the scenes of both Fisk University and NASA headquarters in Washington, D.C., a lifetime of thanks would not be enough.

I offer this work as a humble means to thank;

M r . L e w i s C l a r k

Outline

- 1) Motivation
- 2) Introduction to code 660
- 3) Broad Band X-Ray Telescope (BBXRT)
- 4) Data analysis 1
- 5) Geometry
- 6) What am I doing?
- 7) Data analysis 2
- 8) Doing Physics
- 9) One equation!!!!!!
- 10) Conclusion

1) Motivation

My summer internship at Goddard Space Flight Center really began in August 1990. After being accepted into the graduate program in physics at Fisk University, I found myself for the first time taking classes in astronomy. While studying under Dr. Charles McGruder, I began the study of astrophysics. I read everything that I could about the subject. In the spring of 1991, I began considering thesis projects and settled upon my first scientific inquiry....WHAT ARE GAMMA-RAY BURSTERS?

This one question, propelled me into the realms of High Energy Astrophysics.

The place to be for a summer internship would be a NASA space flight center. Thanks to the Graduate Internship Program sponsored by North Carolina A&T, I was fortunate to be placed in the Laboratory for High Energy Astrophysics at Goddard Space Flight Center for the Summer of 1991.

2) Introduction to code 660

Upon arrival at Goddard Space Flight Center, my first project was to evaluate and update a set of view graphs that depict the activities of the Laboratory for High Energy Astrophysics (code 660). In doing such an evaluation, I was able to talk with researchers in each branch at the Laboratory for High Energy Astrophysics and find a project that will give me experience in data analysis. I found such a place in the X-ray branch analyzing data from Broad Band X-Ray Telescope. Diagram 1 shows the telescope.

3) BBXRT

The Broad Band X-Ray Telescope was designed to provide astronomers with high quality spectra of many of the X-Ray sources in the sky. The strongest soft x-ray source in the sky is the sun lit earth. It was from this sun lit earth data that I did my analysis. Broad Band X-Ray Telescope looks at objects such as galaxies, quasars, blackhole candidates, clusters and super nova remnants just to cite a few. Analysis of the data is often obscured by contamination of the sun lit earth.

4) Data analysis 1

For very weak x-ray sources, the sun shining of the earths atmosphere contaminates the light seen by the telescope. My project for the summer was to establish a calibration to allow for the removal of this contamination. I first accumulated data containing bright earth contamination and began trying to fit combinations of functions that accurately model the data. Diagram 2 shows one such fit.

5) Geometry

I made several mistakes, the most important of which, was that I did not understand the geometry of the telescope, earth, atmosphere, sun and x-ray source. The geometry revealed that florescent contamination occurs between earth-angles of 80-90 degrees. Diagram 3 shows one approach to the geometry.

6) What am I doing?

I was trying to find something in the data that is well known, then from this "benchmark" determine the things that I don't know. Such bench marks are either oxygen or nitrogen florescence.

7) Data analysis 2

Once I had a better understanding of the problem, I was equipped to fit several models to the data and achieve some confidence in the oxygen florescence as a bench mark but not in the nitrogen florescence. To increase the confidence in the oxygen florescence as a benchmark, I wanted to compare the intensity of the data to that predicted by theory. In order to develop an approximation of what I should see, I had to know what basic equations to evaluate. This required a more detailed knowledge of the physical processes.

8) Doing Physics

The physics began at the sun and ended at the detector. The photons produced by the sun interact with the atmosphere and energy is lost. The energy now in the atmosphere is just enough to fluoresce oxygen, producing a certain number of oxygen photons. The number of oxygen photons seen in the data by the detector was very close to the number produced by theoretical calculations thus giving extreme confidence that the oxygen is the "bench mark" that we seek.

9) One equation!!!!!!

The physics of the system can be modeled using several parameters. The number of oxygen photons that are seen by the detector depend upon the cross section, density, fluorescent yield and the path traveled by the oxygen photons. Several approximations can be made about the cross sectional dependence on energy, the exponential nature of density and the fluorescent yield. These approximations are physically justified and yield a detector count rate that is satisfied by the data.

10) Conclusion

Oxygen is a good candidate for calibration of the bright earth background.

APPLICATIONS OF INDUSTRIAL ENGINEERING

completed in

The Ceramics Section
of
The Materials Branch
of
The Office of Flight Assurance

The Graduate Intern Program

in association with
North Carolina Agricultural & Technical State University
and
the Equal Employment Opportunities Office

June - August 1991

by

Walthea V. Yarbrough
Prospective Ph.D. Candidate in Industrial Engineering
Virginia Polytechnic Institute & State University

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V 16 10 11

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1. Introduction

This report summarizes the projects that were completed as a ten week internship assignment at NASA Goddard Space Flight Center. I am employed through the Graduate Intern Program in association with North Carolina Agricultural and Technical State University and the Equal Employment Opportunities Office. This summer I was afforded the opportunity to work in the Ceramics Section of the Materials Branch with Mr. Charles (Chuck) Powers, by completing some of the middle phases of two long term projects.

2. Projects

During the internship period, two projects were attempted and completed: the Stepping Motion Bearing Tester Project and the Memo Search/Find Project. The projects were very different in nature and were designed (either intentionally or unintentionally) to afford me the opportunity to use some of the knowledge and skills that I have gained throughout my college career.

The following subsections detail the two projects by listing the objectives, discussing the approaches, and summarizing the conclusions and recommendations for future study. Figures are referenced that may aid in visualizing the actual processes.

2.1 Stepping Motion Bearing Tester

The Stepping Motion Bearing Tester began as a GOES requirement to study the effects of small angle motion on bearing lifetimes. It had to be able to control the motion of the bearings and to measure any degradation occurring to the bearings. The initial demonstration model accomplished these tasks using a limited rotation DC brushless motor, and a rotary variable differential transformer (RVDT) for closed-loop feedback of angular shaft position.

After the GOES Project became financially unable to support further testing, the testing shifted to an AMSU-A2 Bearing Life Test Project. This project required that the motor make complete rotations, and that it simulate the stepping pattern prescribed by the AMSU-A2 Scan Profile (Appendix A). This pattern needs to be repeated continuously for four years. These

requirements were accomplished using a three-phase DC brushless motor and an optical shaft encoder.

The motion of the motor is presently controlled by a motor controller which constantly receives position commands from an IBM PC via RS-232C communications. This set-up successfully meets the objective of operating a motor using the AMSU-A2 Stepping Pattern, however, two sources of possible failure could be removed with the elimination of the IBM PC and the RS 232C connection. A diagram of the system configuration is shown in Figure 1.

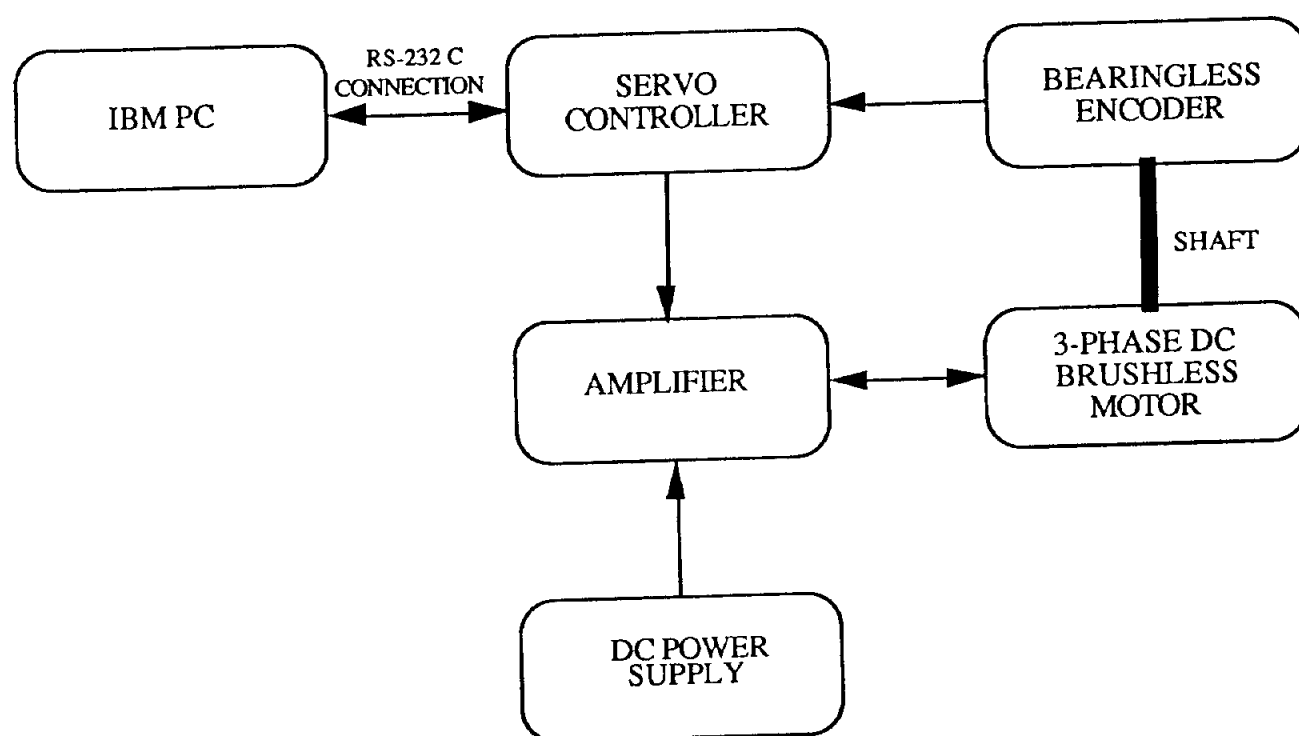


FIGURE 1. JSI SYSTEM CONFIGURATION

2.1.1 Objective

The JSI Digital Servo Controller has the capability to operate without receiving commands constantly from a PC or a terminal. If this feature were used in the bearing life test, two sources of possible failure would be removed, thereby increasing the reliability of the life test. Therefore, the

objective of this work was to program the JSI Digital Servo Controller to control the motor using the stepping pattern prescribed by the AMSU-A2 Scan Profile.

2.1.2 Approach

The tasks in completing this project can be summarized as four steps. They are listed and discussed below.

1. Installing and testing the controller. Prior to this summer, the controller had not yet been connected or tested to ensure proper operation. This was the first step and included the following procedures:

- Connecting the controller to an IBM PC using RS-232C communications.
- Ensuring that communications exist between the PC and the controller.
- Connecting the controller to an amplifier, a motor and, an optical encoder.
- Connecting the amplifier to a DC power supply.

There is a fifth step that was ongoing -- "troubleshooting". Troubleshooting took place during and after all steps. Changes and adjustments were made in an effort to correct the problem(s), then more troubleshooting. The block diagram in Figure 1 illustrates the JSI System Configuration.

2. Learning the function of the different commands and the capabilities of the controller. This step included constant referral to the manual and trial and error. Several exercises were listed in the manual that would illustrate the use of some of the commands if programmed into the controller. I used many of the commands that I thought may be pertinent in programming the AMSU-A2 Stepping Pattern into the controller.

3. Converting the position specifications from degrees to steps. The position commands used by the JSI Servo Controller read the number of steps from the encoder, while the scan profile that I was given to describe the stepping pattern uses degrees to illustrate the movement. Therefore, it was necessary to convert the measurements in the scan profile to encoder steps.

4. Programming the controller. Initially it was thought that a BASIC program must be used in conjunction with the controller to control the movement of the motor. In actuality, the servo controller can be programmed through its sequence feature. A sequence is a defined list of commands. The commands needed to control a specified movement are programmed into the sequence, in order of processing. When the sequence is run, the entire list of commands is activated, one after the other, until the entire sequence has been activated. The sequence for the AMSU-A2 Scan Profile is shown in Appendix B.

2.1.3 Results and Recommendations For Future Study

The JSI Servo Controller can be used for the bearing life tests without constant communication with a terminal or PC. Sequence #6 programmed into the controller contains the

commands for the AMSU-A2 Stepping Pattern. After starting the sequence, the computer can be disconnected from the system, allowing the controller to operate on its own.

At present, the motor has operated continuously for approximately 60 hours. Prior to using the controller for an actual life test, the possibility of testing it for a longer period of time should be considered. In addition, a counter should be developed and attached so that the observer can determine the number of revolutions that the motor has completed at any given time. This is still being studied at the time of this report.

2.2 Memo Search/Find

Memos are used as a means of communicating ones works and/or ideas to others. Members of the Materials Branch oftentimes issue memos to people outside of the Branch. A memo bank and an index file were started in 1973 to store and organize copies of these memos for future reference. Currently, there are more than 6,000 memos.

With the use of PCs in the branch, access to this file can be made easier. A database management program, dBASE III Plus, was incorporated to manage the file. The memos are listed into a dBASE file named Memobank.dbf according to their dates and a keyword list. This keyword list also contains the author's initials.

2.2.1 Objective

There is a need for a user friendly program to assist the user in gaining information that would make locating a memo easier. Hence, the objective of this project is to develop a dBASE III Plus program that would allow the user to gain the necessary information to retrieve the memo(s) being sought upon supplying a word or group of words possibly found in the keyword list or upon supplying the authors name. This will eliminate difficult and cumbersome searches through large numbers of pages and/or memos when seeking reference material.

2.2.2 Approach

Several programs were used to set up the menu driven memo search/find procedure. Each of these programs has a specific purpose and function that is necessary to the overall success of the project. The programs are identified by name and description below. The identification also

indicates the interaction of the program. Figure 2 is a flow chart that illustrates this interaction. The codes for these programs are listed in Appendix B.

GREETING -- This program welcomes the user to the Memo Finder. It also instructs the user and highlights helpful hints on how to use the programs and achieve meaningful results.

FIRSTMNU -- This program prompts the user to decide which of the two ways (by keyword or by author) he/she would like to have the search conducted. It also gives the user opportunities to quit the search or to exit to DOS.

Depending upon the basis for the search that the user chose from FIRSTMNU, one of two programs are called: 1) KEYWRD or 2) ALFABET.

1) **KEYWRD** -- This program prompts the user to input the word(s) that may possibly be in the keyword list of the memo for which he/she is searching. The user is allowed to input as many as three keywords. After the user has input his/her selection of keywords, a list of memos with those keywords in it appears on the screen. After viewing the list, the author has the option of having the list printed or of having another search conducted.

2) **ALFABET** -- The prompt from this program allows the user to input the first initial of the author's first name. Depending on the letter entered at the prompt. One of the LETR* programs may be called (Note: * represents any letter). If the user enters a letter that is not used as a first initial for any of the authors in the Materials Branch, he/she is prompted that the letter entered is invalid.

LETR* -- Each of the LETR programs supplies a list of all the authors with the * first initial. For example: the LETRW program lists all of the authors whose first initial is W. From this list the user can select the author of his/her choice. After the author is selected, a list of all of the memos written by that author is displayed. The user then has the option of having the list printed or of having another search conducted.

PRT -- This program affords the user the option to obtain a hard copy of the listing that he/she has viewed. This program is called from both KEYWRD and from the LETR*

programs. After the listing is printed, the user has the option of exiting or of having another search conducted.

GOODBYE -- This program ends the search. It reiterates the next step in obtaining the memo being sought, and it returns one to the GREETING program where the cycle repeats itself.

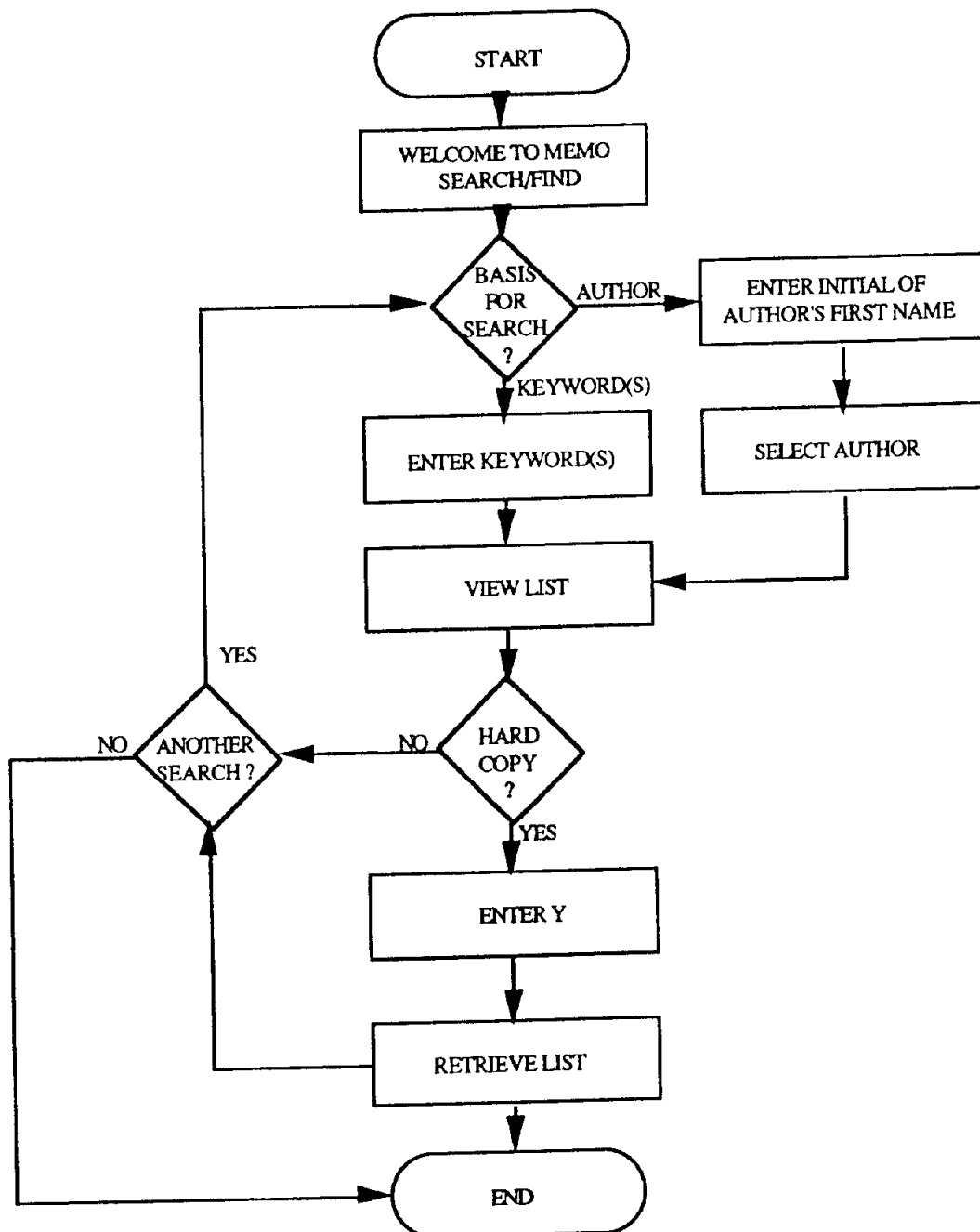


FIGURE 2. MEMOBANK SEARCH/FIND PROCEDURE

2.2.3 Results and Recommendations For Future Study

The Memo Search/Find Project now adequately searches and locates memos. However, as new memos are written, certain tasks need to be performed; they are listed below.

1. Update the database. The database file that contains the listing of the memos should be updated periodically by adding the titles, dates, and authors of memos written since the previous update. Consider the possibility of performing this maintenance at regular intervals.

2. Update authors. As potential memo writers begin working in the Materials Branch, some considerations must be made.

- A. What will be his/her author code?

- B. Is there at least one other person with the same first initial as this person? If so, add his/her name to the corresponding LETR* file. If not, develop a LETR* file corresponding to the first initial of the new person's first name and make the necessary additions to the ALFABET program so that the new LETR* program can be accessed.

In addition to the tasks that must be performed to maintain the Memo Search/Find Project, there are two other things that should be investigated that may make the search more user friendly:

- 1) The possibility of exiting the search from inside a list that is being viewed. Currently the entire list must be displayed on the screen before the user can obtain a printout, conduct another search or exit the search. After one views the information for the memo that he/she is seeking, it may not be necessary for him/her to view the remainder of the list.

- 2) The possibility of giving the user the option of selecting keywords from a list. Currently, the user must have some idea of the subject matter for which he/she is searching. Although most users will have an idea about the subject matter being sought, it may be easier to have possible words that may prompt him/her. This may be accomplished by developing a dictionary listing all words used in the keyword list.

3. Comments

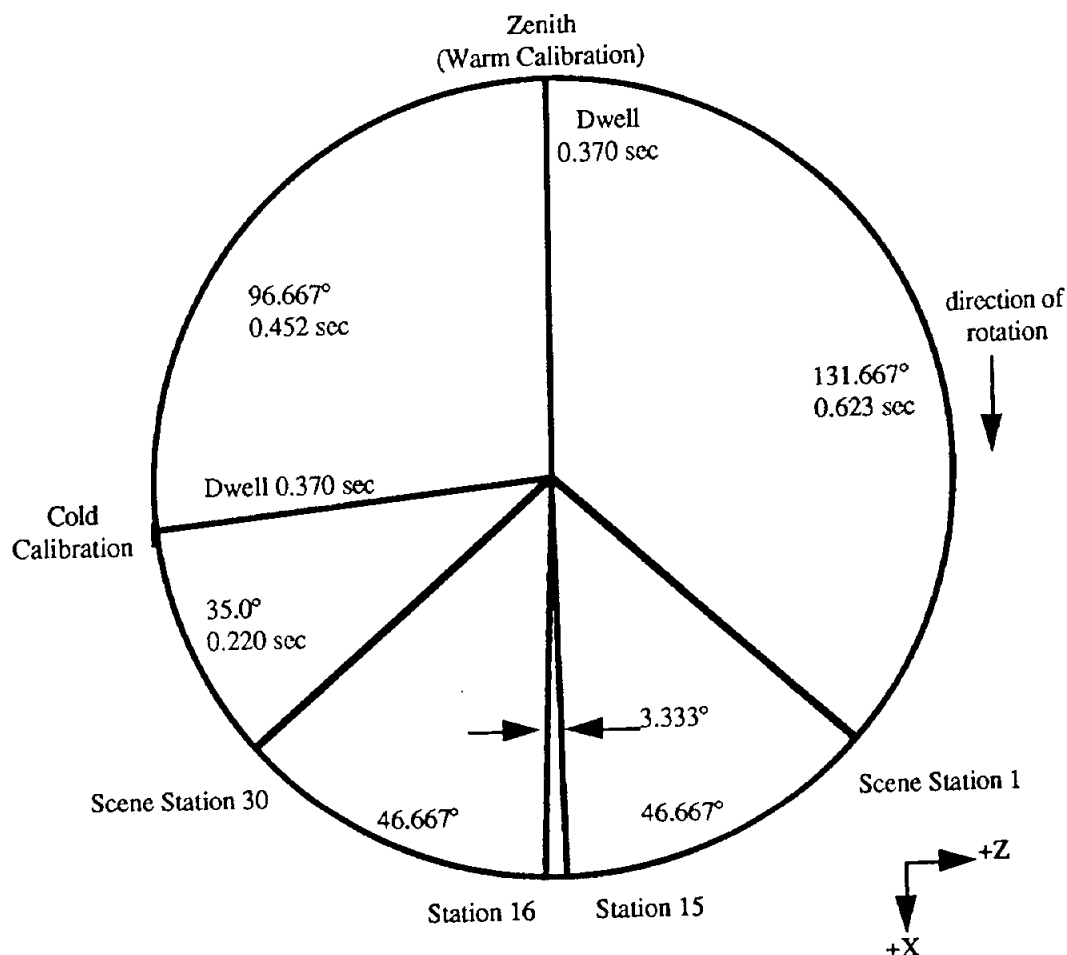
I have found completing both of my projects rewarding. Participating in a project in its development and seeing the relationship with work previously done has been an enlightening experience. Not only was I able to draw upon some of the knowledge that I have gained in college, I also practiced some techniques that may make the research efforts required for completion of my doctoral studies less tiring and frustrating.

4. APPENDICES

- A. AMSU-A2 Scan Profile
- B. JSI AMSU-A2 Scan Profile Sequence
- C. Program Listings For Memo Search/Find Project

APPENDIX A

Positioning & Velocity Specifications for the AMSU-A2 Scan Profile



Scan profile for the AMSU-A2 antenna drive. The scan profile includes 30 scene stations, cold and warm calibration stations, and has an 8 second period. Each scene station has an integration time (dwell time) of 158 msec.

REFERENCE: NASA Goddard Space Flight Center internal memorandum dated July 25, 1990, Mr. Charles Powers to Mr. Jack Hayes, subject: "Minutes from the AMSU-A2 Pre-Life Test Planning Meeting."

APPENDIX B

JSI AMSU-A2 SCAN PROFILE SEQUENCE

XE6

XD6

L0

D44

G

T.158

N

D467

G

T.370

D1301

G

T.370

D1756

G

T.623

N

XT

XR6

APPENDIX C

**PROGRAM LISTINGS FOR MEMO
SEARCH/FIND PROJECT**

*****GREETING.PRG*****

*

*This program welcomes the user to the Memo Finder. It also
*instructs the user and highlights helpful hints on how to use
*the programs to achieve meaningful results.

*

CLEAR

SET TALK OFF

@ 5,25 SAY "GREETINGS!"

@ 8,10 SAY "Welcome to the Memo Search Finder Database."

WAIT

CLEAR

@ 9,10 SAY "The memos within the materials branch from 1973 "

@ 10,10 SAY "until the present time can be accessed from this"

@ 11,10 say "database."

WAIT

CLEAR

@ 10,10 SAY "You can view the portion of the listing that you"

@ 11,10 SAY "choose by following the directions. "

WAIT

CLEAR

@ 8,10 say "The memos are identified by title and by a date "

@ 9,10 say "code, which you will need to know to successfully"

@ 10,10 say "obtain the memo for which you are searching."

WAIT

CLEAR

@ 8,10 SAY "After you have located the memo that you would "

@ 9,10 SAY "like to view, please see Ron Hunkeler (299) for a copy of"

@ 10,10 SAY "the memo(s). REMEMBER: You must have the title and"

@ 11,10 SAY "the date code so that the memo can be located."

WAIT

CLEAR

REPEAT=1

@ 10,20 SAY "PRESS 0 TO REVIEW DIRECTIONS AGAIN."

@ 11,20 SAY "PRESS ANY OTHER NUMBER TO CONTINUE."GET REPEAT PICTURE

"9"

READ

DO CASE

CASE REPEAT=0

DO GREETINGS

OTHERWISE

DO FIRSTMNU

ENDCASE

SET TALK OFF

RETURN

*****FIRSTMNU.PRG*****

*

*This program prompts the user to decide which of the two ways
*(by keyword or by author) he/she would like to have the search
*conducted. It also gives the user opportunities to quit the
*search or to exit to DOS.

*

CLOSE ALL

CLEAR

SET BELL OFF

SET TALK OFF

@ 3,17 SAY "HOW WOULD YOU LIKE TO PERFORM THE MEMO SEARCH?"

@ 6,30 SAY "BY KEYWORD -- ENTER K"

@ 9,30 SAY "BY AUTHOR -- ENTER A"

SEARCH = SPACE(1)

@ 12,30 SAY "ENTER YOUR CHOICE " GET SEARCH PICTURE "@A!"

@ 18,30 SAY "TYPE Q TO EXIT SEARCH"

@ 19,30 SAY "TYPE E TO RETURN TO DOS"

READ

DO CASE

CASE SEARCH="A"

DO ALFABET

CASE SEARCH="K"

DO KEYWRD

CASE SEARCH="Q"

DO GOODBYE

CASE SEARCH="E"

CLEAR

@ 10,30 SAY "EXITING THE PROGRAM"

WAIT

QUIT

OTHERWISE

CLEAR

@ 15,28 SAY "****Enter either K or A****"

@ 17,28 SAY "TYPE Q TO EXIT"

RETURN

DO FIRSTMNU

ENDCASE

SET TALK OFF

SET BELL ON

RETURN

*****KEYWRD.PRG*****

*

*This program prompts the user to input the word(s) that may be
*possibly in the keyword list of the memo for which he/she is
*searching. The user is allowed to input as many as three key-
*words. After the user has input his/her selection of keywords
*a list of memos with those keywords in it appears on the screen.
*After viewing the list, the author has the option of having the
*list printed or of having another search conducted.

*

SET TALK OFF

SET BELL OFF

USE MEMOBANK

NUMBER=4

CLEAR

@ 10,15 SAY "HOW MANY KEYWORDS WOULD YOU LIKE TO ENTER?"

@ 11,15 SAY "1, 2, OR 3? (ENTER THE NUMBER)"GET NUMBER PICTURE
"9"

@ 18,15 SAY "ENTER 0 TO RETURN TO PREVIOUS SCREEN"

READ

DO CASE

CASE NUMBER=1

KEYWRD1=SPACE(64)

KEYWRD2=SPACE(64)

KEYWRD3=SPACE(64)

CLEAR

@ 10,10 SAY "ENTER THE KEYWORD THAT YOU WOULD LIKE TO USE"

@ 11,15 SAY "TO PERFORM THE SEARCH."

@ 13,10 GET KEYWRD1 PICTURE "@!"

READ

DO WHILE .NOT. EOF()

DISPLAY ALL FOR TRIM("&KEYWRD1")\$KEYWORDS

WAIT

CLEAR

PRT=SPACE(1)

@ 10,10 SAY "WOULD YOU LIKE A HARD COPY OF THE LIST?" GET

PRT PICTURE "Y"

READ

EXIT

ENDDO

CASE NUMBER=2

KEYWRD1=SPACE(64)

KEYWRD2=SPACE(64)

KEYWRD3=SPACE(64)

CLEAR

@ 8,10 SAY "ENTER THE KEYWORDS THAT YOU WOULD LIKE TO "

@ 9,15 SAY "USE TO PERFORM THE SEARCH."

@ 11,5 GET KEYWRD1 PICTURE "@!"

@ 13,5 GET KEYWRD2 PICTURE "@!"

READ

DO WHILE .NOT. EOF()

```

        DISPLAY ALL FOR
        TRIM("&KEYWRD1")$KEYWORDS.OR.TRIM("&KEYWRD2")$KEYWORDS
        WAIT
        CLEAR
        PRT=SPACE(1)
        @10,10 SAY "WOULD YOU LIKE A HARD COPY OF THE
LIST?" GET PRT PICTURE "Y"
        READ
        EXIT
        ENDDO
CASE NUMBER=3
        KEYWRD1=SPACE(64)
        KEYWRD2=SPACE(64)
        KEYWRD3=SPACE(64)
        CLEAR
        @ 8,10 SAY "ENTER THE KEYWORDS THAT YOU WOULD LIKE TO "
        @ 9,15 SAY "USE TO PERFORM THE SEARCH."
        @ 11,5 GET KEYWRD1 PICTURE "@!"
        @ 13,5 GET KEYWRD2 PICTURE "@!"
        @ 15,5 GET KEYWRD3 PICTURE "@!"
        READ
        DO WHILE .NOT. EOF()
            DISPLAY ALL FOR
            TRIM("&KEYWRD1")$KEYWORDS.OR.TRIM("&KEYWRD2")$KEYWORDS
            WAIT
            DISPLAY ALL FOR TRIM("&KEYWRD3")$KEYWORDS
            WAIT
            CLEAR
            PRT=SPACE(1)
            @ 10,10 SAY "WOULD YOU LIKE A HARD COPY OF THE LIST?"
            GET PRT PICTURE "Y"
            READ
            EXIT
            ENDDO
CASE NUMBER=0
        CLEAR
        @ 10,20 SAY "GOODBYE, PROGRAM TERMINATED"
        WAIT
        DO FIRSTMNU
        OTHERWISE
            @15,28 SAY "***ENTER A NUMBER BETWEEN 1 AND 3***"
        ENDCASE
DO CASE
        CASE PRT="Y"
            DO PRT
        OTHERWISE
            ENDCASE
        CLEAR
        ANSWER=SPACE(1)
        @ 10,15 SAY "WOULD YOU LIKE TO PERFORM ANOTHER SEARCH (Y/N)?" GET
        ANSWER PICTURE "Y"
        READ

```

```
DO CASE
  CASE ANSWER="Y"
    DO FIRSTMNU
  CASE ANSWER="N"
    CLEAR
    @ 10,20 SAY "GOODBYE, PROGRAM TERMINATED"
    WAIT
    DO GOODBYE
  ENDCASE
CLOSE DATABASES
SET BELL ON
SET TALK OFF
RETURN
```


*****ALFABET.PRG*****

*

*The prompt from this program allows the user to input the initial of the

*author's first name. Depending on the letter entered at the prompt.

One of the LETR programs may be called (note: * represents any letter).

*If the user enters a letter that is not used as a first initial for any

*of the authors in the Materials Branch, he/she is prompted that the

*letter entered is invalid.

*

CLEAR

SET BELL OFF

SET TALK OFF

INITIAL=SPACE(1)

@ 10,10 SAY "ENTER THE FIRST LETTER OF THE AUTHOR'S FIRST NAME"

GET INITIAL PICTURE "@A!"

READ

DO CASE

CASE INITIAL="A"

DO LETRA

CASE INITIAL="B"

DO LETRB

CASE INITIAL="C"

DO LETRC

CASE INITIAL="D"

DO LETRD

CASE INITIAL="E"

DO LETRE

CASE INITIAL="F"

DO LETRF

CASE INITIAL="G"

DO LETRG

CASE INITIAL="H"

DO LETRH

CASE INITIAL="J"

DO LETRJ

CASE INITIAL="K"

DO LETRK

CASE INITIAL="M"

DO LETRM

CASE INITIAL="N"

DO LETRN

CASE INITIAL="P"

DO LETRP

CASE INITIAL="R"

DO LETRR

CASE INITIAL="S"

DO LETRS

CASE INITIAL="T"

DO LETRT

CASE INITIAL="W"

DO LETRW

CASE INITIAL="Y"
DO LETRY
OTHERWISE
CLEAR
@10,10 SAY "NONE OF THE AUTHOR'S FIRST NAMES BEGIN WITH
&INITIAL."
@11,30 SAY "TRY AGAIN!"

WAIT
DO ALFABET
ENDCASE
SET TALK OFF
SET BELL OFF
RETURN

*****LETRA.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@5,20 SAY "AUTHOR'S WITH A AS THEIR FIRST INITIALS"

@8,30 SAY "ALFRED J. BABECKI (AB)"

@9,30 SAY "ALFRED G. EUBANKS (AE)"

@10,30 SAY "AARON FISHER (AF)"

@11,30 SAY "ALEX F. MONTOYA (AFM)"

@12,30 SAY "ANDREW MATTIE (AM)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOLLOWING
YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(AF)' FOR AARON FISHER"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRB.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH B AS THEIR FIRST INITIALS"

@10,30 SAY "BILL (WILLIAM) CAMPBELL (BC)"

@11,30 SAY "BRADFORD H. PARKER (BP)"

@12,30 SAY "BENJAMIN SEIDENBERG (BS)"

@13,30 SAY "ROBERT E. SHELLEY [BOB] (RS)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR
CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(BC)' FOR BILL CAMPBELL"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRC.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@5,20 SAY "AUTHOR'S WITH C AS THEIR FIRST INITIALS"

@7,25 SAY "H. P. CHU [CHARLIE] (HC)"

@8,10 SAY "CYRUS BUTNER (CB)"

@9,10 SAY "CARROLL H. CLATTERBUCK (CC)"

@10,10 SAY "CHARLES E. POWERES (CEP)"

@11,10 SAY "CARL L. HAEHNER (CH)"

@12,10 SAY "CARL JOHNSON (CJ)"

@8,40 SAY "CARL PALLADINO (CP)"

@9,40 SAY "CHARLES L. STAUGAITIS (CS)"

@10,40 SAY "CARL TAYLOR (CT)"

@11,40 SAY "CHARLES E. VEST (CV)"

@12,40 SAY "CARL L. WALCH (CW)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOLLOWING
YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(CT)' FOR CARL TAYLOR"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRD.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@5,20 SAY "AUTHOR'S WITH D AS THEIR FIRST INITIALS"

@8,30 SAY "DIANE M. KOLOS (DK)"

@9,30 SAY "DAVID A. LINDAUER (DL)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(DK)' FOR DIANE KOLOS"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRE.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@5,20 SAY "AUTHOR'S WITH E AS THEIR FIRST INITIALS"

@8,30 SAY "ERNEST W. MIELKE (EM)"

@9,30 SAY "EDWARD L. SANFORD (ES)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(EM)' FOR ERNEST MIELKE"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRF.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@5,20 SAY "AUTHOR'S WITH F AS THEIR FIRST INITIALS"

@8,30 SAY "FREDERICK C. GROSS (FG)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(FG)' FOR FREDERICK GROSS"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRG.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH G AS THEIR FIRST INITIALS"

@10,30 SAY "GLORIA OH (GO)"

@11,30 SAY "GERALD N. ROBERTS (GR)"

@12,30 SAY "GLENN VANLANDINGHAM (GV)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(GO)' FOR GLORIA OH"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRH.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH H AS THEIR FIRST INITIALS"

@10,30 SAY "HOSSEIN BAHIMAN (HB)"

@11,30 SAY "H. P. CHU [CHARLIE] (HC)"

@12,30 SAY "HENNING W. LEIDECKER (HL)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(HB)' FOR HOSSEIN BAHIMAN"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRJ.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@3,20 SAY "AUTHOR'S WITH J AS THEIR FIRST INITIALS"

@5,10 SAY "JULIE BRUSSLAN (JB)"

@6,10 SAY "JEANNETTE BENAVIDES (JBB)"

@7,10 SAY "JOE A. COLONY (JC)"

@8,10 SAY "JAMES E. CHERN (JEC)"

@9,10 SAY "JOSEPH A. GARDNER (JG)"

@10,10 SAY "JOHN R. HURD (JH)"

@11,10 SAY "JANE E. JELLISON (JJ)"

@12,10 SAY "JOHN J. SCIALDONE (JJS)"

@5,40 SAY "JOANN M. KESTNER (JK)"

@6,40 SAY "JAMES E. MING (JM)"

@7,40 SAY "JOHN J. PARK (JP)"

@8,40 SAY "JEANNETTE STACK (JS)"

@9,40 SAY "JOHN L. TARPLEY (JT)"

@10,40 SAY "JOANNE M. UBER (JU)"

@11,40 SAY "JAMES L. WALL [JIM] (JW)"

@12,40 SAY "JOHNS VAN SANT [TIM] (TV)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOLLOWING
YOUR CHOICE"

@16,10 SAY "FROM THE LISTING ABOVE. EXAMPLE: ENTER '(JH)' FOR JOHN HURD"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRK.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH K AS THEIR FIRST INITIALS"

@10,30 SAY "KITTY ACKERMAN (KA)"

@11,30 SAY "KIMBERLY A. DONNELLY (KD)"

@12,30 SAY "KATHARINE K. SMYTH (KS)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(KA)' FOR KITTY ACKERMAN"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRM.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@5,20 SAY "AUTHOR'S WITH M AS THEIR FIRST INITIALS"

@8,10 SAY "MICHAEL P. BARTHELMY (MB)"

@9,10 SAY "MICHAEL CLARK (MC)"

@10,10 SAY "MARK A. DOMEN (MD)"

@11,10 SAY "MARK A. KNOBLACK (MK)"

@8,40 SAY "MATTHEW B. MAGIDA (MM)"

@9,40 SAY "MARK SARISKY (MS)"

@10,40 SAY "MARY TREUSDELL (MT)"

@11,40 SAY "MICHAEL J. VEINS (MV)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOLLOWING
YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(MD)' FOR MARK DOMEN"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRN.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@5,20 SAY "AUTHOR'S WITH N AS THEIR FIRST INITIALS"

@8,30 SAY "NORMAN HELMOLD (NH)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(NH)' FOR NORMAN HELMOND"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRP.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH P AS THEIR FIRST INITIALS"

@10,30 SAY "PETAR ARSENOVIC (PA)"

@11,30 SAY "PAMELA SCOTT (PS)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR
CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(PS)' FOR PAMELA SCOTT"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRR.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@5,20 SAY "AUTHOR'S WITH R AS THEIR FIRST INITIALS"

@8,10 SAY "ROBERT BAUMANN (RB)"

@9,10 SAY "REBECCA DERRO (RD)"

@10,10 SAY "RONALD J. HUNKELER (RH)"

@11,30 SAY "RONALD E. KOLECKI (RK)"

@8,40 SAY "RICHARD S. MARRIOTT (RM)"

@9,40 SAY "ROAMER E. PTEDMORE (RP)"

@10,40 SAY "ROBERT E. SHELLEY [BOB] (RS)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOLLOWING
YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(RD)' FOR REBECCA DERRO"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRS.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH S AS THEIR FIRST INITIALS"

@10,30 SAY "STACIE CONNORS (SC)"

@11,30 SAY "SHARON GARRISON (SG)"

@12,30 SAY "SUONG LE (SL)"

@13,30 SAY "STEVE PAGANO (SP)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(SL)' FOR SUONG LE"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRT.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH T AS THEIR FIRST INITIALS"

@10,30 SAY "THOMAS M. HESLIN (TH)"

@11,30 SAY "TAE M. KIM (TK)"

@12,30 SAY "THOMAS M. ROBINSON (TR)"

@13,30 SAY "JOHNS VAN SANT [TIM] (TV)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(TK)' FOR TAE KIM"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRW.PRG*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH W AS THEIR FIRST INITIALS"

@10,30 SAY "WALTER VIEHMANN (WV)"

@11,30 SAY "WINSLOW WOMACK (WW)"

@12,30 SAY "BILL [WILLIAM] CAMPBELL (BC)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(WW)' FOR WINSLOW WOMACK"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****LETRY.PRGM*****

*

CLEAR

SET BELL OFF

SET TALK OFF

@8,20 SAY "AUTHOR'S WITH Y AS THEIR FIRST INITIALS"

@10,30 SAY "YURY FLOM (YF)"

@11,30 SAY "S. YEN LEE (YL)"

CHOICE= SPACE(5)

@15,10 SAY "ENTER THE IDENTICAL LETTERS AND PARENTHESIS FOR YOUR CHOICE"

@16,10 SAY "FROM THE LIST ABOVE. EXAMPLE: ENTER '(YF)' FOR YURY FLOM"

@17,35 GET CHOICE PICTURE "@!"

READ

DO AUTHOR

SET TALK OFF

SET BELL ON

RETURN

*****PRT.PRG*****

*

*This program affords the user the option to obtain a hard
*copy of the listing that he/she has viewed. This program
called from both KEYWORD and from the LETR programs.
*After the listing is printed, the user has the option of
*exiting or of having another search conducted.

*

CLEAR

SET PRINT ON

LIST FOR TRIM("&KEYWRD1")\$KEYWORDS.OR.TRIM("&KEYWRD2")\$KEYWORDS

LIST FOR TRIM("&KEYWRD3")\$KEYWORDS

SET PRINT OFF

EJECT

CLOSE DATABASES

RETURN

*****GOODBYE.PRG*****

*

*This program ends the search. It reiterates the next step
*in obtaining the memo being sought, and it returns one to
*the GREETING program where the cycle repeats itself.

*

CLEAR

CLOSE DATABASES

SET TALK OFF

@ 10,20 SAY "THANK YOU FOR YOUR ATTENTION."

@ 11,30 SAY "HAVE A GOOD DAY!"

CLEAR

@ 10,20 SAY "FOR EASIER ACCESS, PLEASE TAKE WITH YOU THE"

@ 11,23 SAY "INFORMATION OBTAINED FROM THIS SEARCH."

WAIT

CLEAR

@ 10,35 SAY "BYE"

WAIT

DO GREETINGS

SET TALK OFF

RETURN